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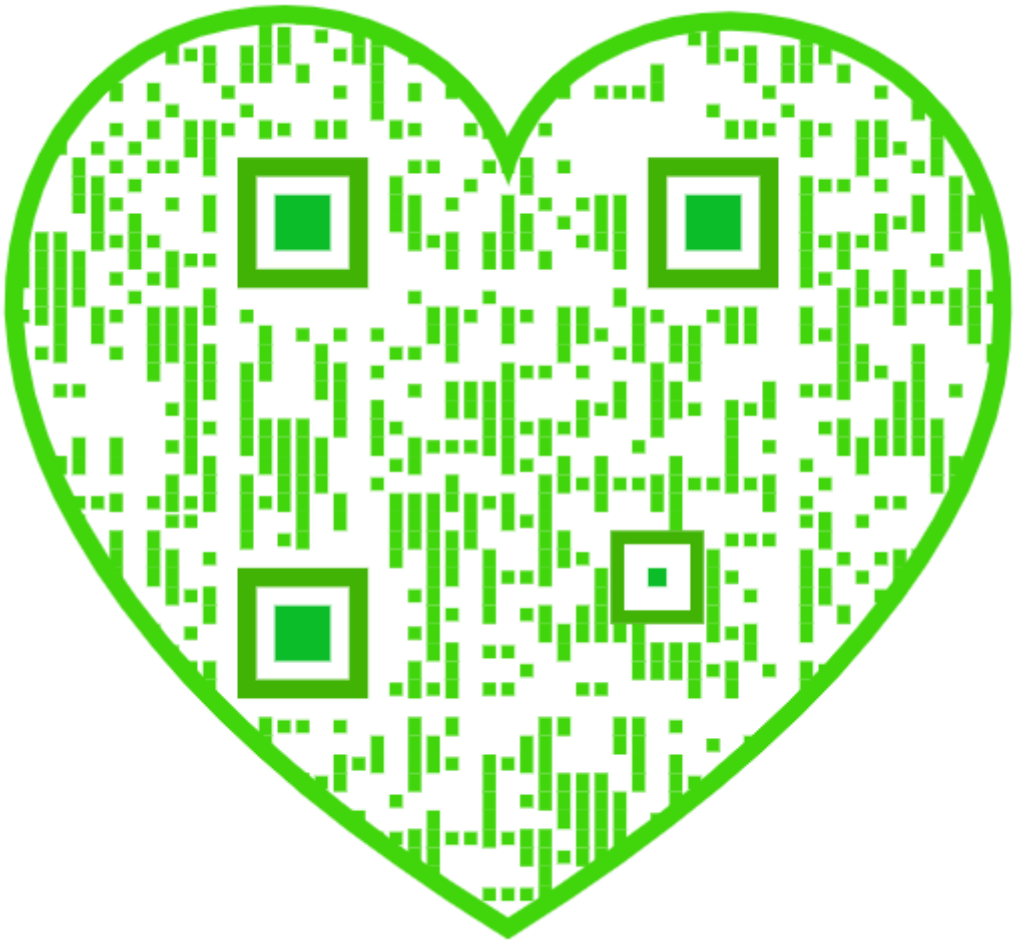

AN OUTLINE OF THE HISTORY AND DEVELOPMENT OF HAND FIREARMS, FROM THE EARLIEST PERIOD TO ABOUT THE END OF THE FIFTEENTH CENTURY.

BY

ROBERT COLTMAN CLEPHAN, F.S.A.,

NEWCASTLE-ON-TYNE.

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AN OUTLINE OF THE HISTORY AND DEVELOPMENT OF HAND FIREARMS, FROM THE EARLIEST PERIOD TO ABOUT THE END OF THE FIFTEENTH CENTURY.

THE early history of ordnance and hand-guns is so intertwined that any very definite differentiation between the two classes of firearms in the earlier stages of their development is most difficult—sometimes, indeed, impossible. I have written at some length on the subjects of early ordnance and gunpowder in a treatise published in *Archæologia Aeliana*,[1] and these notes may be best read in conjunction with, and to some extent in continuation of, those remarks—more especially as many of the records quoted in both treatises may apply to either class of firearms, or are common to both.

The far-reaching character of the subject of early hand-guns makes it impossible in an article like the present to do much more than outline the salient forms and features assumed by these weapons over the period under review, and to gather together the scattered remnants of their history, most of which require sifting and critical examination.

All the English literature we have concerning the earlier forms of the hand-gun is, as far as I have seen, but fragmentary in character; though some of it is of great value, more especially, perhaps, that dealing with gun-locks. In Germany more comprehensive and systematic methods of investigation have been employed, rendered possible by the possession of a number and considerable

[1] "Early Ordnance in Europe" (vol. xxv., 1903).

variety of actual specimens of these weapons in the arsenals and other collections, both public and private, of that country, together with the presence in its archives of a store of contemporary literature and illuminations on the subject; but reliable evidence of this kind is rare until the fifteenth century has been reached, when we have the *Feuerwerksbüchern*, *Geschutz* and *Zeugbüchern*[1] of the different German states, and much besides. This is greatly owing to the geographical position of Germany, and to the almost constant condition of warfare, both foreign and domestic, in which its numerous and loosely-compacted states were engaged during mediæval times and in those of the Renaissance. Many interesting specimens of ancient hand-guns are present in the imperial collections at Vienna, and the National Library of that city contains a most important series of illuminated MSS., and other records, illustrating examples. The same may be said, to a certain extent, to be the case with Switzerland and Belgium; and important collections of hand firearms are on exhibition at Madrid, Paris, Turin, Nuremberg, Dresden, Berlin, the Rotunda at Woolwich, and in t e Tower of London; and there are examples preserved in many other towns of Germany, as well as in Austria. The Emperor Napoleon III. and MM. Reinaud and Favé have contributed much to the knowledge we possess, more especially in the publication, often *in extenso*, of a number of early accounts and other records bearing on the subject. Captain J. Schön[2] and Direktor Essenwien[3] have collected and arranged a mass of information con-

[1] The *zeughaus* was the arsenal, and *zeugbüchern* the inventories of the weapons there. These records often contain drawings of some of the guns in store, and are thus invaluable in the making of history.

[2] *Geschichte der Handfeuerwaffen.* Dresden, 1858.

[3] *Quellen zur Geschichte der Feuerwaffen*, 1872. A work issued by the Germanèsche Museum at Nuremberg.

cerning the history of firearms. A series of valuable contributions to the subject has appeared during the last few years in the *Zeitschrift zur Historische Waffenkunde*, a publication in which the literature on ancient arms and armour contributed by the members of the Verein appears; and in *Beiträge zur Geschichte der Handfeuerwaffen*[1]—both works published at Dresden. To all these sources of information I have been more or less indebted in the preparation of these notes.

There is no contemporary evidence as to when hand-guns were invented or first employed. What are often termed "inventions" are so frequently but the fruits of experience—the culmination, more or less, of a long series of experiments, rather than the discovery of any new principle; and this remark is especially applicable to the evolution of gunpowder and firearms, the beginnings of which are wrapped in the greatest obscurity, and which may have been fortuitous.

Ordnance and hand-guns doubtless grew out of those earlier metal tubes, closed at one end, which were unquestionably used for the propulsion of a preparation of Greek fire, of a kind possessing some explosive properties, however slight, impelled in weapons such as are mentioned in the *Alexiad*,[2] by the Byzantine princess, Anna Comnena, and also in other and later chronicles of mediæval times.

The use of gunpowder with very early ordnance, a large proportion of which was then hardly distinguishable from hand-guns in size, would be suggestive of its further employment with small tubes of metal, fitted into staffs of wood or iron; the weapons formed with a view to being discharged from against the person of a man or from a portable forked rest; the difference between the two varieties of firearms—*i.e*, ordnance and hand-guns—at

[1] *Festschrift zum achtzigsten Geburtstag von Moritz Thierbach.*

[2] Book ii.

that period of their history lying mainly in the distinction between a staff or stock and a stand, though this definition hardly covers the whole question. These early weapons were fired by means of a red-hot iron rod, a live cinder, or a torch, and they therefore required the intervention of more than one man for their manipulation when discharged from against the person or supported on a rest; while a cannon of the period, or even two, could be managed by one man only. Early chronicles merely record the occasions when the weapon was used in warfare; they give no information as to the tentative period, which there must have been before the stage of actual employment in the field had been reached.

Colonel Rudolphe Schmidt, Directeur de la Fabrique Fédérale d'Armes, Berne,[1] gives the following as being the years of the introduction of gunpowder as applied to firearms, into the various countries of Europe:—Belgium, 1313; Germany, 1324; Italy, 1326; England, 1327; Spain, 1331; France, 1338; Switzerland, 1371; Russia, 1389; Sweden, 1400. This writer does not support his statement by any references, but for the Belgian date he doubtless relies on the reputed extract from the archives of Ghent of 1313—"Bussen met kruyt," a passage which cannot now be found, though no serious doubt exists as to its authenticity.[2] His date for Italy is doubtless based on the Florentine record of 1326, which is not now regarded as being entirely beyond suspicion. As to Germany, I have seen nothing earlier than the years 1344-46. Concerning England, John Barbour, Archdeacon of Aberdeen, *writing in 1375*, refers to "crakys of war" as having been employed by King Edward III. in the first year of his reign (1327). This statement, though probable enough, is not beyond question, as Barbour was only

[1] *Les Nouvelles Armes à feu Portatives adoptées comme Armes de guerre dans les Etats modernes*, p. 24.

[2] "Early Ordnance in Europe," p. 4.

about seven years old at the time, and therefore could hardly have written from his own memory.[1] The date he gives for France, 1338, is supported later in these pages; but Colonel Robert, Conservateur du Musée d'Artillerie at Paris, mentions the year 1324, when cannon were employed at the siege of Metz. Unfortunately, he gives no reference, but the probable source is mentioned in footnote.[2]

Gunpowder was being granulated much earlier than is generally supposed—as early as the close of the first quarter of the fifteenth century. The fact is stated in the *Feuerwerksbuch* of Konrad Kauder, of Schöngau, written *anno* 1429.[3] It would seem that the employment of granu-

[1] "Early Ordnance in Europe," p. 4.

[2] Lieutenant-Colonel Max Jähns, in his *Geschichte der Kriegswissenschaften*, 1889, says that the statement is taken from a poem published in Paris in 1875—"La Guerre de Metz en 1324." Presumably it is a contemporary poem or thereabouts, but I do not know that this is so.

[3] *Codex germ.* 4902, at Munich (*Quellen*, p. 25). In the same MS. the quadrant is shown to have been in use with ordnance, thus anticipating the generally accepted date of its introduction for this purpose by a quarter of a century. The range of one of the cannon illustrated on the MS. is given as being 1,500 paces, which is incredible from what is known of the strength of the ordnance of the time and of the ballistic force of the gunpowder employed. In the year 1347, we read in an inventory of warlike stores for the defence of the castle of Bioule published in Napoleon's *Études*, that the troops are enjoined to use first the "arbaletes à tour," which have the longest range; then the "arbalêtes à deux pieds"—that is, the crossbow, into the iron stirrup of which the bowman thrusts his feet when bending it. And coming after these two varieties of crossbow, stones and cannon are mentioned; thus the casting of stones and the firing of cannon are classed last and together, as to range. The Bioule record is, however, more than three-quarters of a century earlier than the *Feuerwerksbuch* of Konrad Kauder, during which interval immense improvement took place, but hardly to such an extent as stated in the Kauder MS.

lated powder had been abandoned for a season, the reason for which is unknown, and resumed at a later period. Possibly the cause of this lies in the structural weakness of the earlier hand-guns. That this was the case with ordnance is tolerably certain, and caused by the imperfect welding together of the strips of iron of which the cannon were composed, rather than from any deficiency in the tensile strength of the iron. In *Codex germ.* 600, at Munich, a MS. dating probably towards the end of the second half of the fourteenth century, which will be more particularly referred to later on in these pages, two kinds of gunpowder are mentioned:—one described as "schlecht" —that is, ordinary—made up of "4 Pfd. Salniter, 1 Pfd. Schwefel, 1 Pfd. Kohle"; and the other, "Ein gut stark pulver," meaning a good strong powder, consisting of "4 Pfd. Salniter, 1 Pfd. Schwefel, 1 Pfd. Kohle, 1 Unze Saltpetrie, and 1 Unze Salarmoniak."[1] The first recipe is clear enough, "salniter" being but another name for saltpetre; but what is the "saltpetrie" in the other? The "salarmoniak" is, of course, a chloride of ammonium. Without knowing more as to the analysis of the saltpetre in use during mediæval times, it is impossible to judge with anything like certainty as to the strength of the compound employed, for so much would depend on the purity of the several ingredients of the mixture. The best saltpetre ought to contain 54 parts of nitric acid and 46 parts of potash; and it may be that the "saltpetrie" mentioned was a saltpetre of special strength.

That ordnance was still small during the period covered by the years 1356-58 may be gathered from documents published in the *Études*.[2] The Emperor reproduces some accounts of the town of Laon, of these years, wherein is mentioned the purchase of 42 cannon for 115 écus, working out about 38s. a-piece in our currency. In the

[1] *Zeitschrift*, B. I. p. 199.

[2] *Études sur le passé et l'avenir de l'artillerie*, T. iii. f. 88-90.

same accounts "un grant canon" with a tail is stated to have cost but very little more.[1] Accounts of the town of Lille show that in the year 1368 23 cannon, fixed on wooden stands, were purchased at Tournay for £23 6s.; and an order from Louis, Duke of Anjou, to the Treasurer of Wars, specifies "quartre canons du pris de douze franx," with which leaden bullets were used, the guns thus costing only 3 francs a-piece. These weapons of 1370 were surely of the nature of hand-guns. General Favé[2] refers to some firearms mentioned in a document of the year 1375 as being attached to stocks, and weighing 24 pounds each, which were certainly hand-guns. We read in *Accounts of the Duke of Burgundy*, "En 1431 il est payé à Pietre Donné, canonier, pour 25 coulevrines de cuivre enfustées en baston, dont les deux d'icelles sont en façon d'une arbaleste, l'une à clef et l'autre sans clef et pour six schambres . . . 62 liv. 10 sous."[3] The barrels were thus of copper, and let into stocks, two of which were shaped like those of the arbalest: one with a serpentine, the other without that movement, but provided with six chambers. These guns, like those ordered by the Duke of Anjou in 1370, cost about 3 francs a-piece, or if the Paris *livre* is meant, about 3s. English. An account of 1390 gives the price of a "handbüschse" in Germany at "11 schilling Heller."[4]

It is, of course, true that the general purchasing power of money was very different in the second half of the fourteenth century and first half of the fifteenth to that prevailing at present,[5] but so also was the cost of the

[1] "Pour un grant canon à queue, acaté à Colart, le chandellier, 3 écus."—*Comptes de Laon.*

[2] *Études sur l'Artillerie.*

[3] Quoted by Sixl, *Zeitschrift*, Band I. f. 251.

[4] J. Würdinger, p. 105.

[5] Besides, the question of the debasement of the coinage had much to say, though this was practised to a much greater extent in France at the time than it was in England.

material for the manufacture of the weapons and of gunpowder, which at that time in France are shown by the Laon records to have been as follows:—Iron 5d. to 6d., gun metal 20d., steel 10d., lead 10d., and gunpowder 120d. the pound. Some accounts of Ravenna, of the year 1358, mention the purchase of saltpetre at 6s. 3d., and sulphur at 3s. the pound. Accounts of the town of Caen, of 1375, show that ten pounds of powder cost more than did "un grant canon"—which, however, though relatively large, was really a small piece. These prices are extremely high, and doubtless quite abnormal owing to the extraordinary demand caused by the war. In England, in 1347, Thomas de Roldeston, Keeper of the King's Privy Wardrobe at the Tower, purchased saltpetre at 18d., and live sulphur at 8d. the pound. At this period all munitions of war were accounted for in the King's Wardrobe Accounts. In 1379 the Keepers of the Castle of Carisbrooke bought 100 pounds of saltpetre at 15d., and 50 pounds of sulphur at 6d. per pound.[1] These varying prices show that it was much a question of local supply and demand. The first known mention of gunpowder in connection with ordnance in any English record occurs, I believe, in *Accounts of the King's Chamber* of 1344, where "Pulvis pro ingeniis" is scheduled.[2] It would appear that Spain, in later times at least, was the cheapest market for gunpowder, for in 1512 purchases were made by the English Government from Francis di Errona, a Spaniard, at 3½d. the pound.[3] In early times the ingredients of gunpowder were usually kept separate until actually required for use, when they were pounded together in a mortar.

The illustrations afforded by illuminations on MSS. are

[1] Rev. Joseph Hunter's "Proofs of the Early Use of Gunpowder in the English Army," published in *Archæologia*, vol. xxxii.

[2] *Ibid.*, p. 381.

[3] *Archæologia*, vol. li. p. 227.

fanciful and inaccurate, and such evidence requires to be received with caution, as being frequently misleading and sometimes worthless; indeed, it is obvious that many of these mediæval draughtsmen had little or no practical knowledge of the weapons they portrayed. Few of the very early MSS. with illustrations of firearms, those so often referred to as dating from the fourteenth century, can, I believe, be accepted as being quite of that period without hesitation; indeed, most of them were probably written somewhat later. But as the fifteenth century advances we are better able to compare the drawings on illuminations with actual examples of hand firearms which have come down to us. Judging from the position of the touchhole, so near the muzzle, as shown in some of the examples given, it would seem that such hand-guns had been quite innocent of any projectile whatever, having been probably used by skirmishers with the object of frightening the horses of men-at-arms, and throwing their ranks into disorder by means of the flash and detonation, a function perhaps more formidable in the then conditions of warfare than that of either killing or wounding the riders. It is, however, impossible to say whether gunpowder or one of the numerous varieties of Greek fire, or "flying fire," had been used with these kinds of guns; perhaps, indeed, both compositions. Greek fire, of which there are many recipes extant, was employed with some firearms discharged from the battlements of Breteuil, ten years after the battle of Creçy, described by Froissart as "canons jetant feu."[1]

There is mention in some contemporary records dating late in the first half of the fourteenth century—a very early period in the history of firearms—of what may have been hand-guns, indeed "one handgone" is especially mentioned in an inventory of the year 1338; but with this exception, if indeed it be an exception, it is impossible

[1] "Le feu, *qui etoit gregois*, se prit au toit de ce beffroy."

to be sure that these weapons were what we understand by the term "hand-gun," for little or no distinction was made at that time and somewhat later in the nomenclature of the different kinds of guns, or it was confused by different writers. The same remarks apply to the names given to mechanical war-engines all through the pages of history, for the older designations were passed on to machines differing absolutely in principle from their forbears. Thus, Valturius, writing in the middle of the fifteenth century, calls crossbows and cannon alike "Balista"; indeed, the term "artillery" itself was employed to express missile-engines generally long before the advent of ordnance.[1]

We find the word "gunnis" in the *Wardrobe Accounts* of 1346;[2] but the term "gonne," or "gunne," as applied to firearms, is met with even earlier, and appears much more frequently in English records than does "bombard." The word "gonne" is probably an abbreviation of mangon or mangona, with its diminutive mangonel, a military engine of mediæval times worked on the principle of torsion combined with that of tension. We find "gonnes" mentioned in the following extract from the *Romance of Syr Tryamour*, a MS. believed to have been written during the reign of King Edward II. (1307-27):—

> "Ordeyned hym full well
> With gonnes and grete stones rounde
> Were throwen downe to the grounde."

But unless the MS. is later than the internal evidence would seem to imply, these engines could not have been cannon. Not that, by any means, such a thing is incredible in this reign, but "grete stones rounde" were more prob-

[1] "Ships heavily charged, carrying artillery, ordnance, and engines of battery."—Holland, *Livy* p. 745.

[2] *Archæologia*, vol. xxxii. p. 381.

ably impelled by mangonels; for early ordnance, up to, say, *anno* 1370, was much too small for such projectiles. Assuming, then, that these "gonnes" were mangonels, we have the clear etymology of the word.

In cases where "gonnes," or "gunnes," are mentioned in old records, hand-guns, or weapons which could be used as such, are sometimes meant. For instance, in an inquisition preserved in the Chapter-house at Westminster, executed in 1375 at Huntercombe, a place belonging to the Abbey of Dorchester, it is stated that forty men attacked the place with "haubergeons, lanceis, balistis, etc., et gonnes." This attack on a manor-house would appear, as Mr. John Hewitt points out,[1] to have been a sudden and local affair, and the "gonnes" mentioned were very probably hand-guns. An indenture between William Latimer and Andrew Guldeford, late Constable of Dover Castle, dated in the year 1372. contains the following entry:—"Cc. garbas sagittarium, vj gonnes."[2] Froissart tells us that at the fight at Pont-de-Comines in 1382—"Et si en y avoient aucuns qui jetoient de bombardes portatives, et qui traioient grands quarriaulx enpennés de fer."[3] These "bombardes portatives" were

[1] *Ancient Armour and Weapons in Europe*, vol. ii. p. 298.

[2] *Archæological Journal*, vol. xi. p. 387.

[3] Vol. ii. p. 235. The word "bombard" occurs shortly after the battle of Creçy, in the contemporary chronicle of Villani, long before the advent of great ordnance; but when that appeared, about 1370-75, such heavy guns usually went by the name. The word is met with in 1363, in connection with quarrel-guns, in *Cpte de Nicole de Dury, Arch. de Valenciennes*; and also in the archives of Perugia of 1364, where it is applied to hand-guns, "una spanne lunghe." "Bombardes à main" are mentioned as having been employed by the Aragonais at the siege of Bonifacio in 1420. The diminutive "bombardelle" is referred to in a Bolognese inventory of 1381. An inventory of the stores of the fortresses de l'Artois of 1383 mentions "7 canons estoffes, dont les 4 sont grans et les 3 sont portatif."

probably the larger hand-guns served by two men, or small portable cannon, the field artillery of the day. Quarrel-guns ("quarriaulx gonnes") are mentioned in the Treasury Accounts of Henry IV. of England (1399-1413); and in those of 1428 there are entries of "bastons à feu." That the missiles "quarriaulx," "carreaux," "garros," "garroks," "garrots" (quarrels, bolts, or musket-arrows) were still being employed with firearms up to the end of the sixteenth century is shown in a Tower inventory, made as late as 1599, in which the entry occurs—"Musket-arrowes, with 56 to be new feathered"; and again in another of 1595, "Musket-arrowes 892 shefe, etc., and one case for demi-calvering";—thus one kind for muskets, the other for small ordnance. They were used at sea, and specially for setting fire to the sails of the vessels of an enemy. These tipped and feathered bolts or arrows were employed with either firearms or espringales,[1] but there would appear to have been some difference, at one time at least, between those in use with the two classes of engines; for in an account of the year 1358, published in Napoleon's *Études,* an item runs: "400 garros winged half for cannon and half for espringales." An entry for 1356-58 mentions "600 garros for cannon winged with brass, costing 32 sh. per 100"; and another, "100 garros winged in three places for cannon, 2¼ écus," which is at practically the same price. In the Accounts of the Constable of Dover Castle of the years 1344 and 1361 these missiles are termed quarrels and garroks, and the former are mentioned in connection with crossbows and espringales. Large and small garrots are scheduled, some with heads, others without. A selection from the entries follows:—"Item, mvjc et xxviij garrotes de majori forma," "ij cofres pleinz de quareles pur albbastes," "iij

[1] Mechanical war-engines worked on the combined principles of tension and torsion, like the ancient ballista.

cofres plainz des quareles pur espringales."[1] Garrots are stated by Ducange to be large shafts thrown by espringales, but the foregoing extracts from the Dover Accounts fail to confirm this. Guillaume Guiart, however, writing in 1297-1304,[2] refers to their use with espringales, thus bearing out the statement made by Ducange; but really the nomenclature used for these arrow-missiles is a quantity almost as uncertain and confusing as are the names employed for the engines themselves. The first record known of "garros" in connection with ordnance in France occurs, I believe, in the year 1338, in a MS. preserved in the Cabinet des Titres, Bibl. Rich., at Paris, copied by M. Léon Lacabane,[3] the passage running—"Un pot-de-fer à traire garros à feu." The quantities of sulphur and saltpetre mentioned as being set aside with 48 of these missiles for the service of this particular gun enables us to form some idea of the weight of each carreau, or garrot, which cannot well have exceeded half a pound. The charcoal for the mixture was prepared when required, and sea-coal was sometimes used as a substitute. An extract from the accounts of the town of Lille of 1347 runs—"Pour un canon dont on giete garos." Victor Gay, in his *Glossaire,* describes garrots at some length, and adds—"Lorsque le garrot est employé dans l'artillerie, il comporte, à ses extremetiés une garnature de deux tampons de cuir entrant à frottement dans l'âme de la piece afin de prevenir toute deviation." He reproduces a drawing of an engine in the form of a dragon, under the year 1472, taken from Valturius—"Machine avec canon lançant un garot." "Les grandes coulevrines" of Charles the Bold, of Burgundy, shot "quarraulx" weighing 15 livres, and some of Italy were double that weight; but Froissart tells

[1] These Dover Castle Accounts are published in the *Archæological Journal*, vol. xi. p. 281.

[2] *Branche des Royaux Lignages.*

[3] In *Bibliothèque de l'Ecole des Chartes.*

us that at Ardres in 1377 some cannon were employed "qui portoient carreaux de deux cents pesant," a weight of 200 pounds each! There is a fifteenth-century example of a small carreau figured in a MS. in the British Museum,[1] and many actual specimens may be seen among collections of arms and armour both at home and abroad. The equivalent in German for guns with which bolts or quarrels are employed is "Pfeilbüchsen."

When in chronicles or other records terms occur such as Hand-gunnes, Hand-gonnes, Handbüchsen, Hantpühsen, Handbuse, Quenons à main, Petites bouches à feu, Bombardes à main, Canon à main, Knallbüchsen, Klotzbüchsen, Sclopos, Schioppi, Scopetum, Scopitus, Schiopetto, Coulevrines emmanchées, Escopettes,[2] or the various forms of Harquebus, there can be little doubt as to the class of weapons meant. The terms "hand-cannon" and "coulevrine à main"[3] generally denote portable pieces worked by two men from a stand or rampart. In 1467 Louis XI. armed the *Garde civique* with "le vouge, la lance ou la coulevrine."

The designation "büchsen" is often applied in German records of the second half of the fourteenth century, and even later, indifferently to both hand-guns and ordnance. For instance, in *Codex germ.* 600, a MS. in the Köngl Hof

[1] *Add. MS.* 24,945, fol. 94.

[2] "Escopette," used by the French. Mentioned in 1465 in *Trattato di archit, civile e milit.* (Francesco di Georgi Martini); and "scopites" in 1420, in *De rebus corsicis* (Petrus Cirnaeus). "Dans les creux des mâts et les tours des vaisseaux etoient continuellëment des ennemis lançant des traits auxquels aussi etoient mélées des bombardes à main, d'arain fondu percées en facon de canne; ils les appellent scopites."—Susane, *Hist. d'Artill.*, quoted by Le Duc.

[3] An *Inv. de l'Artill. de Dijon* of 1445 schedules "2 colovrines à main"; while Juvenal des Ursins writes under the year 1411—"Et bien que canons que coulevrines."

und Staatsbibliothek at Munich, entitled, in translation, "Directions for the Preparation of Powder. How to load Büchsen and how to discharge them,"[1] the büchsen therein mentioned are, with one exception, very small field and siege pieces—short tubes of iron fastened on to wooden stands. A weapon illustrated in the MS., and re-

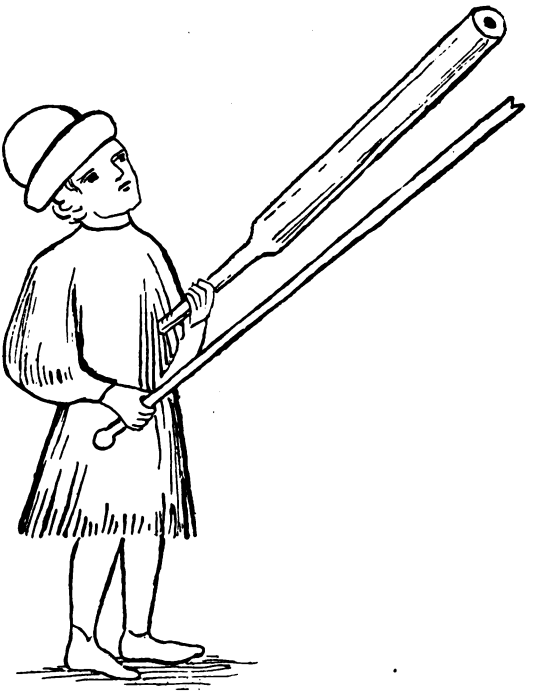

FIG. 1.—Marksman. *Codex germ.* 600.

produced on Fig. 1 in these notes, which differs in principle from the others given, is fitted on to a rounded wooden stock and is being held out in the marksman's left hand. The weapon looks heavy, though the proportions of the drawing are such as to make any approximate estimate of

[1] *Anleitung Schiesspulver zu bereiten. Büchsen zu laden und zu beschiessen.*

weight difficult. The length of the barrel would tend to date the weapon in the early years of the fifteenth century. The soldier is clad in a civil garment, a gown or tunic with long sleeves, and reaching down below the knees. The man holds in his hand a long nicked stick with a knob at the foot, which can only be intended to represent a forked rest. Among the ordnance illustrated in the MS. is a cannon on its wheeled carriage, worked on the rack principle for elevation and depression, an invention usually supposed to date about the end of the first quarter of the fifteenth century. Another of the cannon given consists of fourteen small barrels bound together around a cylindrical block, a very primitive form of *orgue* or *mitrailleuse*. The MS. is generally attributed to the second half of the fourteenth century, but the internal evidence would incline to put it somewhat later, though there is nothing decisive as to date in the fashioning of the costumes. Still, the great variety of the pieces portrayed, and the advanced character of some of them, are strong points in favour of a date near the close of the century. The drawings are very rough, and the colour given to the pieces denotes that they are of iron. In the text of this MS. the large guns are termed "pumharts"—*i.e.*, bombards.

In some Low Country records of early fifteenth-century date, I believe, the first distinction in name is made between firearms for throwing balls of lead and those for stone, in the designations "Lotbüchsen" and "Steinbüchsen" respectively; *loot* or *lot* being the Flemish equivalent for lead. That balls of both iron and lead were being cast in Germany in 1388 is shown by some Memmingen records of that year, in an extract given by Würdinger[1]—"Ulrich Beham giesst in Memmingen Kugeln von Blei und Eisen." Colonel Schmidt states that balls of lead were cast in Switzerland in 1365, but that iron balls came later. Balls

[1] *Eine Kriegsgeschichte von Bayern, etc.*, B. I, s. 104.

of iron and lead are mentioned in England during the reign of King Edward III. (1327-77), by the surgeon John Anderne, in his curious treatise *Practica*[1]—"C'est poudre vault à gettere pelotes de fer on de plom ou dareyne, ove un instrument qe lem appelle gonne." In *Codex lat.* No. 7,239, in the Paris Library, dating, say, 1425-50, we read of "pillulae plumbeae"; and in *Codex* 197, at Munich, a record of a rather earlier date, "lapis bombardarium."[2] More than one German MS. believed to be of the second half of the fourteenth century, probably of the last quarter, give directions for loading—three-fifths of the barrel to be filled with powder, leaving the remaining two-fifths for the wad and bullet or ball.

In early Italian records the term "bombarde" is often employed indiscriminately to denote both cannon and hand-guns, and Froissart alludes to what must have been guns according to the context as "carreaux," their missiles; so that some other clue than the term set down, such as that of weight or dimensions, is often necessary to determine the character of the weapon mentioned. In bills and accounts there is often some guide in the cost set down for a gun; or in other important particulars, such as the quantities of sulphur and saltpetre with a stated number of missiles, which are sometimes set aside for the service of a particular gun; but these sources of information, together with entries in inventories and inquisitions, bring out clearly the fact that there were very few firearms made anywhere during the fourteenth and early fifteenth centuries in comparison with the numbers of other kinds of weapons and engines of war. This fact is demonstrated as regards hand-guns in various illuminations of the period in which bodies of foot-soldiers are depicted; where, for instance, a single soldier armed with a gun is shown standing among a motley crowd of crossbow-men, hal-

[1] *Sloane MSS.*, 335-795. [2] *Zeitschrift*, B. I, s. 280.

bardiers, and others; and we see from German and other inventories of warlike stores what a very small number of firearms were stored in arsenals. But as the fifteenth century advances so does the proportion of these weapons increase by leaps and bounds. Such, indeed, was the rapidity of the increase in the proportionate use of hand-guns that we find nearly a third of the infantry of the army of Charles the Bold of Burgundy, in his wars against the Swiss Cantons and their allies in 1476-77, to have been armed with these weapons.[1] This is shown in the following passage:—"Les dits alliés comme il me fut dit par ceux qui y estoient pourvoient bien être trente-un mille hommes de pied, bien choises et bien armés; c'est à scavoir onze mille piques, dix mille hallebardes, dix mille couleuvrines."[2] At the battle of Newburg the Swiss captured 800 *arquebuses à croc*.[3] In 1496, according to Colonel Schmidt,[4] the proportion of the splendid Spanish infantry armed with the harquebus amounted to a third, the German a sixth, one-tenth in that of France, while in England the numbers were proportionately much smaller owing to the preference given to the national weapon of the English, the longbow. Olivier de la Marche, referring to the troops collected by Charles the Bold of Burgundy, states that the army had "300 bouches à feu sans les harcquebusses et coulevrines dont il en a sans nombre."

The generic term in mediæval Latin for tubes of metal in the sense of ordnance or hand-guns is "cannones," a word probably derived from the Latin "canna," a reed or tube, and practically handed down to the present day; but in the fourteenth century and somewhat later both

[1] *Mémoires de Commines*, L. v. f. 222.

[2] Several of the excellent museums of Switzerland contain examples of both ordnance and hand-guns, stated to have been taken from the Burgundians in the campaign of 1476-77.

[3] *Archæologia*, vol. xxxiii. p. 389.

[4] *Nouvelles Armes à Feu portatives*, p. 29.

"cannones" and the word "canon" were often applied to firearms quite irrespective of size. Claude Fauchet,[1] writing shortly after the middle of the sixteenth century, remarks, though quite erroneously, that ordnance "fut premièrement appellé Bombarde et puis Canon, pource qu'il est creux comme vne canne ou canon, etc."

The successful employment of gunpowder as a motive force with engines for effecting the purposes of the "trébuchet," a great war-machine worked, as its name implies, on the principle of counterpoise, would be very suggestive of its extension to hand weapons to work with the bow, and more especially the crossbow.

It is but natural that very early experiments in gunnery should have been made with ordnance fixed on to a stand, and it would take some time before the necessary condition of familiarity and confidence had been reached for a man to fire off a piece with the stock pressed against his person or held under his armpit; so we may assume that the earliest firearms were attached to and fired from wooden stands or rests. But, as already stated, such weapons were very small; and hand-guns, in the earlier stages, did not differ much in form from firearms discharged from stands. It was from these beginnings that both classes of weapons developed, and the distinction between them in the early stages was, to a certain extent, arbitrary.

The Latin word "sclopus" is applied very early in Italy to denote a small hand-gun for manipulation by one man only, and it appears in various forms in the Latin and Italian languages, such as "scopetus," "sclopetum," "schiopetto," etc. Azario, describing the attack on Casalecchio by the Bolognese in 1360, mentions "sclopos uncinos ferreos, balistas," etc., as being among the engines of war employed in assaulting the place, and the word occurs as early as 1331-33, as will be shown later in

[1] *Origines des Chevalliers, Armories et Heraux*, p. 57.

these notes.[1] The name and weapon soon made its way northwards, for we find a "sclopetum" referred to under the year 1430 as a new Augsburg invention—"Wird in Augsburg eine neue art Büchse erfunden, sclopetum genannt."[2] Larger guns are sometimes, though very rarely, referred to under these names, so that the surrounding circumstances of each case always require to be taken into account for absolute determination, though there is often nothing beyond the bald statement. An extract from a Bolognese inventory of artillery, of the year 1397, follows:—"Unum scolpum parvum a cavalito et sine cavalito—8 sclopos de ferro de quibus sunt 3 a manibus."[3] A "cavalito" is a stand, thus a small sclopus on a stand is scheduled, and another without a stand; and of 8 iron sclopos, three are, strictly speaking, hand-guns.

Probably Italy was the first country to employ firearms with a detonating mixture of the nature of gunpowder, though Colonel Rudolph Schmidt and others assign the precedence in this respect to Belgium, England, and Germany, in their order. But however this may be, the new invention soon found its way to all the countries of chivalry, and very early to England, at a time when that country was constantly engaged in warfare and ready to welcome any new departure in the art of war. France, it would seem, was somewhat longer in grasping the importance of the invention.

Muratori, in *Rerum Italicarum Scriptores*, gives a passage from the *Chronicles of Cividale* of 1331[4]—"Ponentes vasa versus Civitatum"; "Et extrinseci balistabant cum sclopo versus Terram."[5] These passages are quoted by several

[1] Muratori, *Rerum Italicarum Scriptores*, T. 18, c. 176; quoted in the *Royal Artillery Institution Proceedings*, vol. v. p. 26.

[2] *Quellen*, p. 27.

[3] "*Inv. de l'Artill. de Bologne*," p. 364 (quoted by Gay).

[4] Cividale, a town in the Province of Fruili.

[5] *Zeitschrift* (Sixl) I. p. 114.

writers. The word "vasa" may be said to be an equivalent of "gone," and the "sclopus" here mentioned is almost certainly a hand-gun, for the term is applied almost invariably to a small variety of that weapon. The word in another form, "sclopetus," is again met with in an Italian record of 1333.[1] The first descriptive mention of hand-guns in Italy occurs, I believe, in the oft-quoted case of Perugia, in the archives of which city the following passage was observed, under the year 1364:—"Il nostre comune di Perugia fece fare—500 bombarde una spanne lunghe, etc.;" an extraordinarily large number of hand-guns for that early period, and the only instance of the kind met with. This record, describing the weapons as being a span long, further enjoins that they should be capable of driving their bullets through any armour "e passavano ogni armatura," but history does not tell us that any such result was accomplished, and it is more than doubtful. The foregoing extracts from Italian records of undoubted authenticity are suggestive of the possibility that hand-guns were in use in Italy as early as the years 1331-33, and the large number of these weapons ordered by the chief authorities of Perugia in 1364 would point to the probability that this order was by no means the first one given out by the city for hand firearms.

That we had hand-guns, as well as cannon, in England *anno* 1338, eight years before the battle of Crecy, is fairly clear from an entry in an indenture of that year between John Starlyng and Helmyng Leget, the same running—"La hulke appelle *X'pofre de la Tour,* dont John Kyngeston est meistre, iii canons de ferr ove v chambres, *un hangone.*"[2] And the "pot-de-fer" from which garros were discharged, mentioned in an inventory of the same year deposited in the Cabinet des Titres of the Biblio-

[1] *Zeitschrift* (Sixl) I. p. 115.

[2] Roll TG 1,1097. Copied by Sir N. H. Nicholas in his *History of the Royal Navy.*

théque Richelieu at Paris,[1] must have been very small, and was probably of the nature of a hand-gun—to judge, at least, from the quantity of gunpowder set aside for the service of the weapon. As already stated, cannon were employed in the same year (1338) in France, a fact vouched for by several records. The first mention of cannon made by Froissart is when the French, under Mirepoix, besieged Quesnoy in 1340,[2] and he writes of cannons and bombardes "qui jetoient grands carreaux"; but Ducange gives authority that ordnance was in use two years earlier, at the siege of Puy Guilleaume, a castle in Auvergne; and then we have the statement of Colonel Robert, of Paris, already noticed, that cannon were present at the siege of Metz in 1324.

One cannot resist the impression that the making of hand-guns, as well as ordnance, dates farther, perhaps much farther back than appears on any clear and reliable record yet discovered, and that the Ghent mention of 1313, discussed in Clephan's "Early Ordnance in Europe," is not only authentic, but that even that year is probably by no means the earliest date when cannon were to be found in the arsenals of Italy, the Low Countries, and elsewhere.

Probably the earliest type of ordnance is that formed in two distinct cylindrical parts—the box or chamber for the powder, and the barrel portion for the quarrel or ball. The two parts fitted together on to a stand with an upright end, and secured by a wedge called a *laichet;* or the two parts held firmly together by means of a stirrup-formed iron binder, which was attached to the barrel portion, and on this binder being moved over the end of the box or chamber, the attachment was complete. If this be the first form, it was followed as early as 1338 by what would certainly seem to be homogeneous chambered pieces with movable breech-blocks, of which several

[1] *Les Titres scellés de Clairambault.*

[2] Johne's *Froissart*, vol. i. p. 190.

for each gun were often kept charged, to be in readiness for a rapid continuance of fire; and this invention was afterwards applied to the larger kinds of what may be termed hand-guns. Why the chamber system, as applied to cannon, which began so far back, should have fallen into disuse for so long is not apparent; probably there were difficulties with the escape of gas through the breech.

We hear but little of hand-guns in English records before the Wars of the Roses, owing, perhaps, more than anything else to the great popularity of the longbow; but cannon would appear to have been in general use on fortifications in England early in the fifteenth century, for "iiij gonnes" are scheduled in a Holy Island inventory of 1401,[1] and similar entries appear under the year 1409 and later.[2] Shortly before the Civil War broke out in 1455 we find the following items occurring in a *Roll of Purchases* for the use of the same castle of Holy Island[3] for the year 1446:—

"Bought ij hand-gunnis de fer . . iiiij's.
item gonepouder . . . iiiij's."

Holinshed states that King Edward IV. (1461-83), landing at Ravenspur in Yorkshire in 1471, brought over and introduced hand-guns or muskets into England; but the corps in question was a Burgundian contingent, which fought under the banner of the Earl of Warwick at the second Battle of St. Albans. Juvenal des Ursins mentions hand-guns in connection with the siege of Arras, under the year 1414;[4] and in 1459 or thereabouts they are alluded to in the Paston Letters.

As to Germany, the first record I have been able to find bearing on the subject of *feuerwaffen* at all is a passage

[1] On the coast of Northumberland.
[2] *Archæologia*, vol. xxxiii. p. 63.
[3] *Archæologia*, vol. xxii. p. 63.
[4] Hewitt's *Armour*, vol. iii. p. 486.

quoted by Essenwein,[1] under the year 1344, which runs—"Beim Erzbischofe von Mainz befand sich ein Feuerschutze"; but this doubtless refers to ordnance. We hear of hand-guns mentioned in a smith's accounts of Ratisbon, in 1375, and the city of Augsburg employed thirty hand-guns in its war with the nobles of France, Saxony, and Bavaria in 1381.[2] Nuremberg had forty-eight guns in its arsenal in 1388. The Ratisbon record runs—"11 in Holz verrichtete Büchse die zusammen 120 pund wiegen,"—that is, weighing eleven pounds a-piece; while one of Nuremberg of the same year mentions that "Unter der Nurnberger Truppen konnten 48 gut schiessen und laden, 8 minder";[3] and another record of 1388 runs—"Bei jedem sturm 10 Handbüchsen";[4] while chronicles of the towns of Möhringen and Kaufbeuren of the same year contain clear mention of these weapons.

These extracts and records are sufficient to show that hand-guns were employed in Germany early in the last quarter of the fourteenth century: and in all probability this was the case in the third quarter also, for, as already stated, some of the records concerning the "büchsen" of that period may just as well refer to hand-guns as to ordnance; indeed, many of the weapons, though perhaps not strictly speaking hand-guns, yet partook of that character, for the metal portion of both classes of weapons was quite similar in form and construction: the hand-gun then was a cannon in miniature. The first form of hand-gun fitted with a stock for discharge from against the person of a man, or held under his arm, of which there is any distinct particulars, is a short graduated tube of bronze or iron, with the touchhole on the top side and the metal

[1] J. Würdinger, *Ein Kriegsgeschichte von Bayern, etc., of 1347-1506.*

[2] Captain Schön, *Geschichte der Handfeuernaffer*, p. 11. Dresden, 1858.

[3] Würdinger, vol. i. p. 104. [4] *Ibid.*

tube of the gun set into the end of a nearly straight wooden staff or iron stock, secured by hoops, clamps, or rings of iron; the staff formed something like a broom handle, and sometimes narrowing slightly towards the end. Such a weapon was found among the grass-grown ruins of Veste Tannenberg, excavated in 1849. This, a castle in Hesse, was besieged and taken in 1399, and never restored or rebuilt; and the discovery furnishes us with an undoubted example of a hand-gun of the second half of the fourteenth century. This weapon, cast in bronze, is now in the Germanischę Museum at Nuremberg. Part of the wooden staff was found with the gun, but it dropped to pieces when exposed to the air; an iron ramrod was also present. The casting is in three divisions: the end portion for letting into the wooden

FIG. 2.—The Tannenberg Hand-gun.

staff, the middle division forming the chamber, and the third the barrel. The outer form is octagonal, and the walls of the chamber are thicker than those of the barrel, whilst the muzzle is strengthened by an outer thickening or ring. The touchhole, 3 mm. in diameter, is on the uppermost side of the barrel; it is bored perpendicularly, and there is a small, shallow, oblong extension along the barrel, to afford sufficient space for the priming. The length of the casting is 0.33 m., roughly about 13 inches; the calibre is 35 mm., and the weight of the metal tube 1.24 kilogrammes. This specimen is illustrated on Fig. 2. An illumination in the Ambras Collection, Codex 141, affords a drawing of a weapon very similar to the Tannenberg gun, though it is somewhat larger, and perhaps slightly later in date. We read in Dr. Hefner's book[1]

[1] *Die Burg Tannenberg und ihre Ausgrabungen*, published 1850.

that the fall of the Castle of Tannenberg was brought about mainly by heavy ordnance. One piece threw stone balls rather larger than a man's head, while another, brought from Frankfort, is stated to have been a very large "pumhart" (bombard); and the 8¼ cwt. stone balls found among the ruins were probably shot from that cannon. These projectiles are extraordinarily large, being nearly twice the size of the largest cannon-ball in the collection at the Castle of Newcastle-upon-Tyne.[1] Among the armament of the besiegers was a "Fustbusse"—presumably a weapon held in the fist, the prototype of the pistol (?). The service of the artillery on the battlements of the fortress is stated to have been very inefficient.

Another very early form of hand-gun, which continued in use right through the fifteenth century, is simply a short round tube—a cylinder a span long, ringed round the muzzle, the touchhole on the top side; and an illustration of a weapon of this kind occurs in Burney MS. No. 169, fol. 127. It is figured by Mr. John Hewitt in his book *Ancient Armour*, and is reproduced from that copy on Fig. 3 in these pages. Mr. Hewitt judges the weapon to be of iron, from the colour on the illumination; the metal portion is let into a long, straight wooden staff. The soldier shown on the drawing holds the piece with his left hand, at a considerable angle, the stock passed under the right armpit, while with his right hand he applies the match. The recoil of the piece must have been very slight. The MS. is *Des fais du grant Alexandre*, rendered into French from the Latin version by Vasque de Luce. We lack data to determine which of these descriptions—the guns illustrated on Figs. 2 and 3—is the earlier. The last-named is the ruder looking weapon of the two; but to judge from illuminations and actual examples left to us, it continued in general use much longer than the

[1] "Roman and Mediæval Military Engines," by R. Coltman Clephan, published in *Archæologia Æliana*, vol. xxiv.

other—that is to say, in the more primitive forms. An illustration in *Codex Phil.* 63, a MS. in the University Library at Gottingen, exhibits an outwardly polygonal iron tube, strengthened by five or six rings shrunk on; it is heavier and of greater length than the hand-gun illustrated on Fig. 3. The weapon is discharged from a forked rest, and the touchhole is placed slightly towards the right—points indicative of a rather later date. It is illustrated on

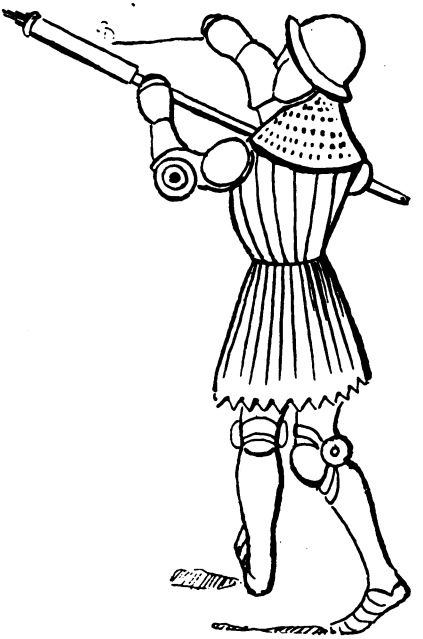

FIG. 3.—From Burney MS. No. 169.

Fig. 4. This Gottingen record,[1] written on parchment, is probably of very early fifteenth-century date. The soldier, who is igniting the priming with a red-hot iron rod, wears a brimmed iron hat; a camail or collar of chain-mail covers his shoulders, and under it is a surcoat,

[1] Konrad Kyeser's *Kriegsbuch* (Bellifortis).

long and sleeveless, with a slit in front and a fringe along the bottom of the garment. Save for the camail the

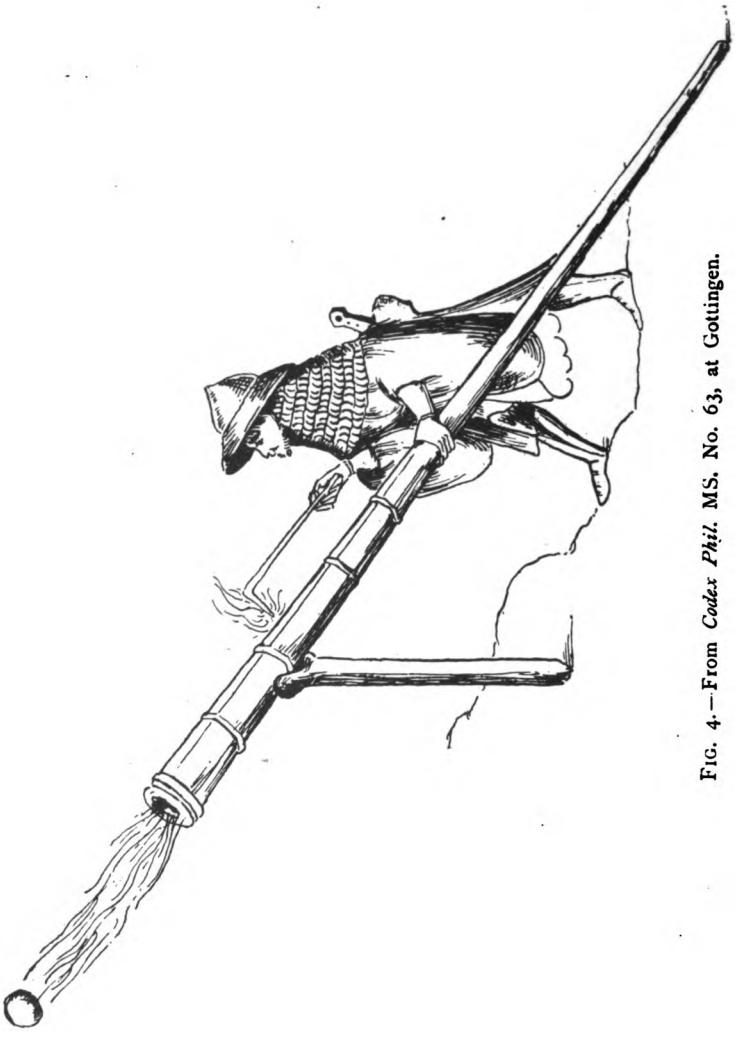

FIG. 4.—From *Codex Phil.* MS. No. 63, at Gottingen.

soldier is clad in complete plate armour, and he wears the characteristic sword of the period. A MS., No. 535, in the Biblioth de Basançon, of about the year 1400, gives

a drawing of a very similar weapon.[1] An inventory of stores in the Bastide de Sainct Anthoine of the year 1428 contains the item—"xvii canons à main dont les deux sont de cuivre et les xv de fer, sans chambres";[2] and Würdinger refers[3] to an entry of the year 1378, in the town records of Nuremberg, mentioning 2 copper and 2 iron Büchsen. That tin was mixed with the copper is shown by many entries in accounts. In the Hof Bibliothek at Vienna are some illuminations of very early hand-guns. Among them, Codex MS. No. 3,069, of the beginning of the fifteenth century, exhibits a weapon with a round tube which, though longer than that given in Burney MS. No. 169, is in other respects similar. Another example of a hand-gun is given in the same MS., provided with a mechanical appliance for bringing the lighted match into contact with the priming, a remarkable circumstance which will be referred to more particularly later in these notes. An early form of hand-gun is figured on a piece of tapestry in the Church of Notre Dame at Nantilly, Saumur. The piece is served by two soldiers, one of them holding it at the present, whilst his comrade applies a live coal. The form of the visored bascinet would indicate a date near the end of the fourteenth century. Fig. 5, which presents the figure of a soldier armed with a sclopitus, has been selected from the *Hauslab Bild-Codex*, illuminations dating about the end of the first quarter of the fifteenth century. The iron hat with a brim was much worn by the soldiery of that period. These references may suffice in establishing the very early types of hand-guns, as shown more especially on illuminations.

Actual specimens of hand-guns of about the end of the fourteenth century are very rare. A weapon in the Germanische Museum at Nuremberg has even some his-

[1] Gay, *Glossaire*, p. 273.

[2] Hewitt's *Ancient Armour*, vol. iii. p. 485.

[3] *Eine Kriegsgeschichte von Bayern, etc., 1347-1506.*

toric authority, for it is believed to have been preserved in the arsenal at Dresden from early times, though no record concerning it appears in what remains of the archives. The length of the wrought-iron tube is 255 mm., calibre 42 mm.; it is octagonal in outward form, like the piece found at Tannenberg. The somewhat pear-shaped chamber is 85 mm. long by 34 wide, and

FIG. 5.—Figure from the *Hauslab Bild-Codex.*

the touchhole is basin-shaped. The stock has been preserved, and the tube is well sunk in the wood, secured to it by two iron clamps, whilst an iron plate covers the junction with the stock. This example, though hardly, strictly speaking, a hand-gun, still comes into that class. It is shown on Fig. 6, and its date is probably about that of the Tannenberg gun, a weapon of the second half of the fourteenth century, the earliest known type. A hand-

gun at Linz dates perhaps somewhat later—say, the end of the century. It is a short iron cylinder, round outwardly, with a tang, slightly curved at the butt-end, for socketing into the stock. The barrel is 153 mm. long, with a

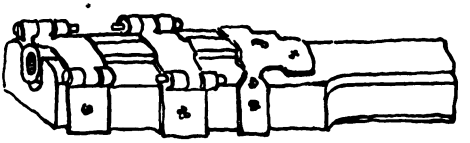

FIG. 6.—Hand-gun at Nuremberg, Dresdner-Büchse.

calibre of about 32 mm. The touchhole is beaten out into a sort of flash-pan. This example is illustrated on Fig. 7. Some further particulars of these two weapons

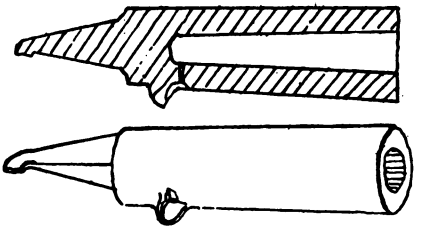

FIG. 7.—Hand-gun at Linz.

may be read in some notes by Oberst Thierbach,[1] and I am indebted to that paper for the illustrations. Another example in the museum at Nuremberg is illustrated on Fig. 8.

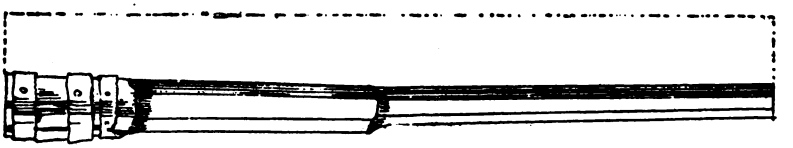

FIG. 8.—Hand-gun at Nuremberg.

The hand-gun, though in the main an infantry weapon, was to some extent employed by cavalry, probably as early as the first quarter of the fifteenth century, which

[1] *Zeitschrift*, vol. i. part 6.

squadrons of light-horse developed in a later age into companies of German *reiters* and pistoliers. Victor Gay[1] gives a mounted figure, reproduced from *MS. lat.* 7,239, fol. 79 vo., in the *Bibliothèque Richelieu*, dated about *anno* 1425, or perhaps rather later, which is copied here on Fig. 9. The codex is entitled "Tractatus Pauli sanctini Ducensis de re militari et machinis bellicis."

The horseman, "Eques sclopettariis," is armed with a

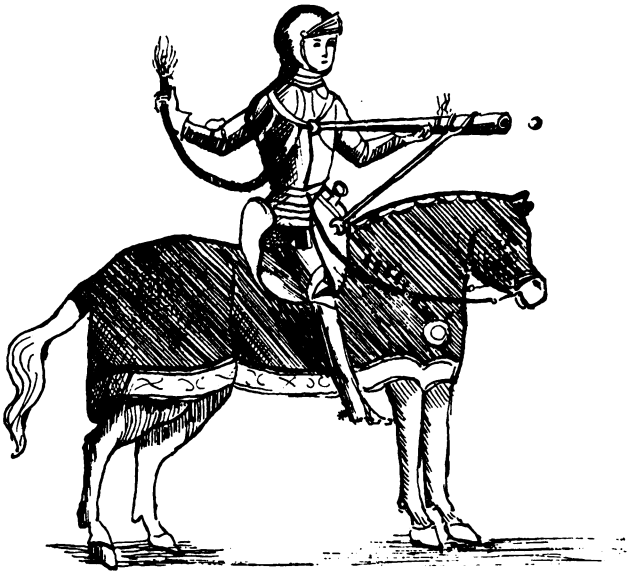

FIG. 9.—Illustration from *MS. lat.* 7,239, in the *Bibliothèque Richelieu.*

sclopitus or *scopitus*, a light hand-bombard or culverin—just a short iron cylinder with a stock of the same metal, and a ring at the end; the touchhole on the top side. The round, narrow stock is about one and a half times the length of the tube. The weapon is strung on to a leathern strap or necklace passed round the horseman's neck, so that it hangs down securely against his breast after discharge or when not in use. A short forked rest,

[1] *Glossaire Archéologique du Moyen Age et de la Renaissance.*

to support the weapon when at the present, hangs by another ring fixed in the saddle-bow. The horseman holds a burning match in his right hand, while the left supports the piece in position for discharge. For reloading the strap would require loosening. The visored bascinet and general character of the armour correspond with those in use in the first quarter of the fifteenth century. The horse is barded. Mr. John Hewitt[1] gives a very similar mounted figure, save that the bascinet of the horseman is pointed at the crown, while that shown on *MS. lat.* 7,239 is rounded. Mr. Hewitt copied this figure from De Vigne's *Vade-mecum du Peintre*, stated in that work to have been reproduced from a miniature in a MS. in the Bibliothèque de Bourgogne, at Brussels. Demmin[2] and Viollet le Duc[3] both reproduce this figure, referring to the same source.[4] It is regrettable that no reference to the particular MS. is given by either Le Duc or Demmin.[5] I searched through every MS. of anything like the period in the library at Brussels, but could not find the miniature, and was informed by the librarian that others had been on the same quest with a like want of success, and that nothing is known of it there. In German records we find a similar figure to that given by De Vigne, armed with such a weapon, in *Codex. lat.* 197, a MS. in the Royal Library at Munich, the date of which, judging from the armour worn, should be in the first quarter of the fifteenth century. The sclopetus shown therein has a *hak* or spur, placed there to prevent the weapon from slipping along the forked rest when

[1] *Ancient Armour*, vol. iii. p. 555.

[2] *Arms and Armour*, p. 511.

[3] *Dictionnaire du mobilier français*, T. vi. p. 331.

[4] There is another very similar shown in the *Marianus Jacobus MS.* at Venice.

[5] Le Duc presents his figure clad in "Gothic" armour, with a salade.

held at an angle. The horse drawn in the Paris MS. is stationary at the moment of firing, whilst that given in the Munich record is shown at the gallop. In both cases the hands of the riders are fully engaged with the manipulation of their weapons, thus exhibiting an excellent degree of training in the animals. These light hand-guns were sometimes discharged from horseback pistol-fashion—that is, held out at arms' length, and an example of this kind may be seen in *Codex germ.* 734 in the Munich Library,

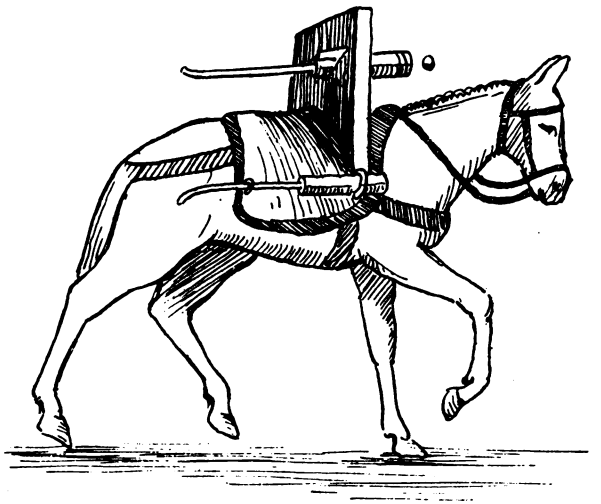

FIG. 10.—"Asellus portans in sella tres scopitos."

the horseman guiding his steed with the left hand. Victor Gay[1] reproduces from the same source as that of Fig. 9,[2] the figure of an ass armed with three scopitos, and under it is written—"Asellus portans in sella tres scopitos [sclopos]." These three hand-guns are disposed, one through a wooden shield or pavise placed on the front of the saddle, whilst the other two weapons are fastened to it on either flank. The ass with the guns is illustrated on Fig. 10. Cavalry armed with light hand-guns were

[1] *Glossaire*, p. 73. [2] Fo. 72 vo.

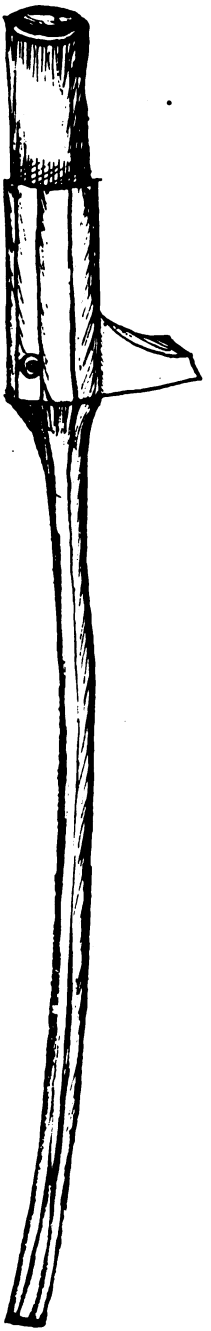

FIG. 11*a*.

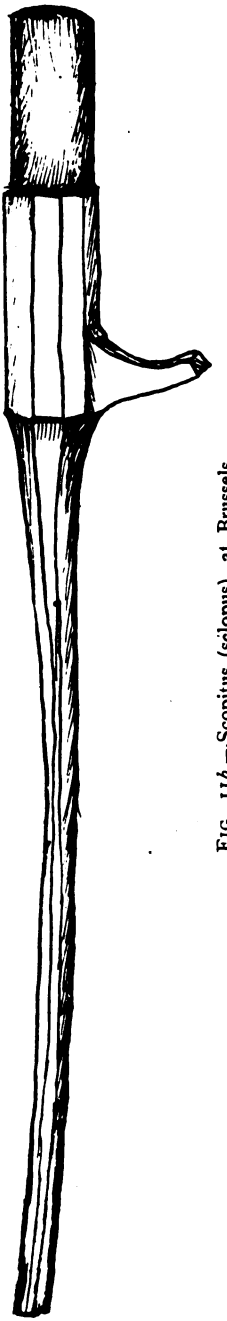

FIG. 11*b*.—Scopitus (sclopus), at Brussels.

employed by the French against Ferdinand of Naples towards the end of the fifteenth century.[1] These weapons, still in use early in the sixteenth century, are quite similar to the one shown on Fig. 9. An actual specimen of a scopitus, sclopus, schiopetto, or escopetto may be seen in the Porte-de-Hal Collection at Brussels.[2] It is of forged iron, the barrel formed octagonally outwardly, touchhole on the top side. The stock is a curved rod of iron, and there is a *hak* or spur of the same material—according in both respects with the weapon already referred to as being illustrated on *Codex lat.* 197, a MS. at Munich. The total length of the Brussels sclopus is 1.22 m.; that of the tube, 0.28 m.; calibre, 00.47 m. This, a specimen of the fifteenth century, is in excellent condition. It was found at the Castle of Horst, Rhode-Saint Pierre. The weapon is illustrated in two positions on Fig. 11 (*a* and *b*). There is no ring at the end of the stock, and thus it is probably the hand-gun of a footman. The sclopus was the prototype of the weapon known later as the petronel. The word itself survived in "scloppetaria" until the nineteenth century, in a work on the rifle by Colonel Beaufoy, published in 1812.

Fig. 12 is a reproduction from an illustration given by Viollet le Duc.,[3] who furnishes no clue as to its source. The figure, clad in a hauberk of chain-mail, is discharging the weapon held under his left arm. The salade and greaves would point to a date in the first half of the fifteenth century. The cavalry variety of hand-gun, which Mr. Hewitt and others call a petronel, is discharged from against the right breast ("sur la mamelle droite").[4] The petronel, however, is described by President

[1] Hewitt's *Ancient Armour*, vol. iii. p. 554.

[2] *Catalogue*, Series X. No. 10.

[3] *Dictionnaire*, vol. vi. p. 332.

[4] Some would derive the name from "poitrine," but this is impossible.

Claude Fauchet, writing in the second half of the sixteenth century, as a media between the harquebus and pistol; certainly a fair enough definition of the weapon as represented in Fig. 9, but I am not aware of there being

FIG. 12.—From an Illustration by Viollet le Duc.

any evidence that the word itself was ever used so early as the first quarter of the fifteenth century. Fauchet, more than a hundred years later, writes—[1] "Depuis

[1] *Origines, etc.*, p. 58.

vingt ou trente ans, l'on appelle Petrinals de pareils instruméts, moyens entre les Harquebuzes et Pistolles; ayans aussi vn roüet plus fort et soudain. Et l'on croit que ceste arme, soit inuention de bandoüiller des monts Pirenees." But this writer is referring to the period of the wheel-lock. Claude Fauchet, like many other writers, when treating of a bygone age, is often far too apt to fall into the anachronism of depicting many such things as coincident with his own times or those of a generation or two back; and such evidence, though very interesting, is often quite unreliable or of little value without some confirmation from contemporary sources, on which only much dependence can be placed. Fauchet was, however, a close and reliable observer of his own times.

Francis Carpezani, in his commentary on the life of Philip de Commines, refers to both light and heavy cavalry, and the passage which follows to some extent defines the difference between the sclopus and the harquebus of the time; or at least shows that the former was used by light cavalry. Philip de Commines led the first line himself at the Battle of Morat (Murten) in 1476: a troop of light-armed horse, with as many sclopetos, and the same number of arquebusiers armed with a heavier weapon. The passage runs—"Ducebat primam aciem ipse cum sexentes equitibus levis armaturae todiemque sclopetariis ac pari numero arcubusariis;[1] thus a distinction is made between the two classes of hand-guns. This difference is, moreover, clearly defined in a record dated about 1468—with figures of an "archibuso" and a "schioppiüs"—entitled *Machinarum liber,* written by Francesco di Giorgi Martini, who lived 1423-1506. The archibuso is more than double the size of the schioppius. The schioppi shown on this record

[1] *Comment.*, Fr. Carpezani (Gay).

are provided with a form of serpentine the nature of which it is impossible to make out.[1] There is an "escopette" (sclopus) with a spur in the Musée d'Artillerie at Paris, but the weapon is of a more advanced type, dating about *anno* 1500.

When the Yeomen of the Guard were enrolled in England in 1485 one-half of the men were armed with the longbow, the other moiety with the harquebus; the latter possibly a similar weapon to that employed by the Burgundians at Murten in 1476, and also by a corps of 6000 Swiss in the same engagement. The first Englishman of note that we hear of as having been killed by a hand-gun was the Earl of Shrewsbury, in 1453.

We learn from a record published in the *Études* that a "cannoile" was made for the town of Tournai, by one Peter of Bruges, in 1346; and at its trial the ball struck off the head of a fuller of the place, for which act of carelessness the said Peter narrowly escaped with his life; and Knyghton tells us that Sir Thomas Morieux was killed by a gun in 1359.

After the first quarter of the fifteenth century the progress made with the hand-gun towards greater efficiency took rapid strides, up to which time and for half a century later the makers of these weapons continued to be mainly guided by certain empirical rules of thumb, suggested by a very limited experience. The rising tide of the Renaissance, diffusing in all directions a spirit of inquiry, began to make itself felt here also in the application of scientific methods and mathematical calculation to the construction of hand-guns; but in the fourteenth century, and for long after, the weapon found but scant acceptance at the hands of the military bodies of the day; for, besides the manifold imperfections of firearms, their employment was thought to be unfair and against the true

[1] *Zeitschrift*, vol. i. p. 277.

spirit of chivalry, and that it greatly did away with fighting hand-to-hand, thus tending to discourage individual prowess and initiative. Even after the close of the first half of the sixteenth century we find Claude Fauchet inveighing against firearms.[1] This feeling is not surprising, for the hand-gun, even when Fauchet wrote, though vastly improved, was still uncertain in aim, besides being clumsy and heavy to carry with the addition of the rest, bullets, and match, and different grains of powder for priming and charging. It was short in range and dilatory in action, indeed inefficient in every possible way. Its importance in the warfare of mediæval times was much exaggerated by the superstitious terrors it inspired, for the effect of the discharge was for long more moral than physical; indeed, the chief advantage of the weapon lay then in the confusion caused in the ranks of the men-at-arms, in the frightening of the horses by means of the flash and detonation; for the ballistic force of the projectile was unequal to penetrating the corselets of the riders. The longbow and the crossbow were far more effective in action than the clumsy metal tube stuck on to the end of a stick; not only in regard to precision of aim, but also in the number of missiles that could be discharged from them in a given time, and it is principally for these reasons that we find so little mention of hand-guns in the literature of the period. It was not before the

[1] "Et neantmoins, encores estoit-ce auec peu d'effait et seullement contre les murailles: ou és grandes batailles, que ces engins estoient employez. Jusqués à ce que la coüardise ou foiblesse d'aucuns (car tant s'en faut que les vaillans Cheualliers approoussent ces inuentions ennemies de proüesse) qu'il se trouue que les Arbalestes ont esté reprouuees (âinsi quei'ay dit) es batailles d'entre Chrestiés: aussi bien que les Sagettes flesches, et les espees enuenimees, jusques à ce que la rage et furie des hommes les ont réduës maniables. Car lors elles s'appellerent Couleurines à main; longues de trois à quartre pieds." *L'Origines, etc.*, p. 57.

making of these weapons had passed through long tentative stages that there was any rivalry to speak of between them and the longbow in England, which was not completely superseded by the hand-gun before the reign of Queen Elizabeth. There were many competitions between the two weapons, and also with the crossbow, during the seventeenth century, which usually resulted in the triumph of the bow over its still clumsy rival. As late as 1792 a trial took place between the musket and crossbow at Pacton Green, Cumberland, when, at a hundred paces, the quarrels hit the target sixteen times out of twenty shots, whilst the musket-balls made twelve hits only. The crossbow (the prodd) continued in use for the chase until long after the reign of Queen Elizabeth. The queen employed it in the hunting-field at Cowdray.

There is very little information available as to the range of hand-guns over the period under review: a *Schützenbrief* of Eichstadt of the year 1487 gives it at about 200 yards.[1]

That there are not more specimens of ancient hand-guns left to us is not surprising, for, as has been shown, comparatively few were made, and each new type would tend soon to become obsolete in face of the rapid improvements taking place, and all the condemned old tubes would be wanted for the forge, owing to the dearness of the metal. Still, it must be admitted that the evidence furnished by illuminations rather goes to show that the older forms were for long employed by the side of others of newer types. Owing to these causes, it is much more difficult to trace the history and evolution of early hand-guns than is the case with ordnance of the same period, which latter had a much more important bearing on the art of war, more especially after the close of the third quarter of the fourteenth century, when we first begin to have heavy ordnance; up to which time the then small pieces of artillery were incapable of knocking down a wall, and could in

[1] *Quellen*, p. 112.

nowise compete in weight of projectile or general efficiency with mechanical engines of war, such as the trébuchet, espringale, robinet, etc.

At Zittau there is a hand-gun dating probably towards the end of the fourteenth century, and here we find the first trace of the hakénbüchse, hagnpuchsn, hagbut, hackbutt, hakenbuse, haquebutte, arquebus, archibuse, arquebuse-à-croc, etc., and harquebus—originally all names for the same weapon. The prefix "haken," with variations, refers to the hak, haken, or croc, which is the spur of iron projecting from the bottom side of the piece, placed well towards the muzzle end, its object being to sustain the shock of the recoil by resting the spur against the outer side of a breastwork, or on a portable stand of wood. As already mentioned, a small spur of the kind was also placed on some sclopos, used by light cavalry, with which a small forked rest was used, which hung at the saddle-bow. This was in order to prevent the weapon from sliding along the fork when being fired at an angle. The suffix "à croc" is the equivalent in French for hak or haken.

Fauchet[1] states that the early French name for hand-guns, meaning the larger size, was "Couleurines-à-main," and he gives his opinion as to the origin of the designation "harquebus" as follows:—"Cet instrument s'appella depuis Haquebute and maintenant a pris le nom de Haquebuze: que ceux qui pésent le nom estre Italien luy ont donné; comme qui diroit Arc-à-trou,[2] que les Italiés appellent Bouzo, Arca-bouzo."[3] This rather raises the question of the etymology of the word büchse, buzo, buse, or buze, and as to whether or not it may have been originally "bouzo," a point possibly involving the country of origin of the weapon itself. Hakenbüchsen are mentioned in a German record dating in 1421, as being then in

[1] *Origines, etc.*, F. 58.

[2] Bow with a mouth.

[3] Arc-à-bouche.

the arsenal at Munich—"Die stadt München besass . . . 400 Terase- Schirm- Stein- Hand- und Hakenbüchsen."[1] In Italy, *anno* 1465, the weapon was called Archibuso or Archibuse, and is described as a new kind of

FIG. 13*a*.

FIG. 13*b*.—Hakenbüchse at Nuremberg.

hand-gun 3 to 4 feet long.[2] A harquebus of the first quarter of the fifteenth century may be seen in the Nuremberg collection, with its tang for driving home

[1] *Quellen*, s. 21.

[2] *Trattato di architettura civile e militare*, and *Machinarum liber:* both by Francesco di Giorgi Martini (1423-1506).

in the wooden stock, in the form of a long wavy rod. The weapon is illustrated on Fig. 13 (*a* and *b*). Another, a perhaps slightly later though still early, example is preserved at Berne, the iron stem of which, 5 cm. in length, is riveted through the flat iron tang or tail of the piece and through the stock. The touchhole, 5 mm. in diameter, is round, and placed slightly on the right side of the barrel for the convenience of the hand in the process of discharge, a point perhaps indicative of a rather later date than that appertaining to the example at Zittau. The wrought-iron barrel is nine-cornered outwardly, and the stock, now black with age, is of oak. The weight with the stock is 4.25 kg., the calibre 33 mm. Some further details of this interesting piece may be read in an article, one of a valuable series, by Oberst Sixl.[1]

The *hac* or spur of these weapons is often forged on to a ring encircling the barrel, placed at various distances from the muzzle. The Berne example, after remaining in the arsenal for centuries, is now preserved in the local museum, which contains many other specimens of arms and armour of great interest. This weapon is illustrated in two positions on Fig. 14. There is another old weapon of the early harquebus type in the arsenal at Schwarzburg. The touchhole, with the iron beaten out to form a flash-pan, is at the side of the piece. Length of barrel, 0.50 m.; that of chamber, 0.26 m.; of stock, 0.77 m.; inner diameter of chamber, 6 cm.; that of barrel, 12 cm. The weapon is heavy, requiring the co-operation of two men to work.

A much lighter weapon than the example at Schwarzburg, found in Switzerland, is in the possession of Dr. Robert Forrer of Strassburg. It is of wrought-iron, and sexagonal in outward form. Length, 16.7 cm.; diameter of barrel, 5.5 cm.; weight of barrel, about 2½ kilo-

[1] *Zeitschrift für historische Waffenkunde*, vol. i. part 7.

grammes. The chamber is 13.5 cm. long, and the touch-hole, on the top side, is 0.7 cm. in diameter. Calibre,

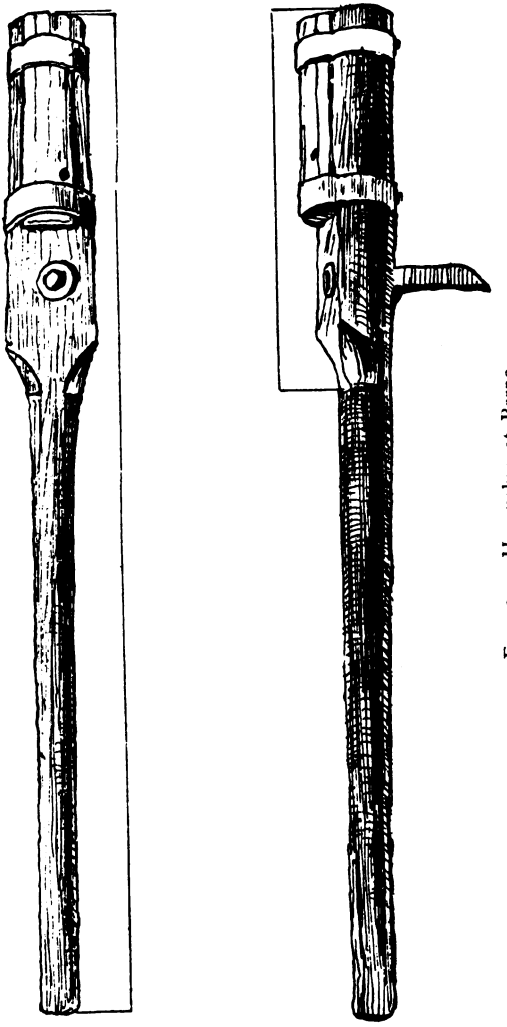

FIG. 14.—Harquebus at Berne.

about 3 cm., being nearly the same as that of the harquebus at Berne, and it is very similar to that weapon, but

with two important differences—viz., the position of the touchhole, and the absence of a spur.

Dr. Forrer is also in possession of a later example, one probably dating in the third quarter of the fifteenth century. It is of bronze, octagonal in outward form; 57 cm. in length; weight, 4.35 kg.; calibre, 1.6 cm.; the touchhole still on the top side. These weapons are illustrated in *Beiträge zur Geschichte der Handfeuerwaffen.*[1] It may be here remarked that the position of the touchhole, even as late as the second half of the fifteenth century, by no means always affords any decisive proof of date; but in cases of that period, when the vent is on the top side, the weapon had probably been used with a forked rest, and in the following manner, as well described by Viollet le Duc:—"Ce devaient être des pièces de ce genre que portaient deux hommes: l'un des deux servait d'affût en plaçant cette pièce sur son épaule et là maintenant au moyen d'une courroie (strap); l'autre posait la culasse sur une fourchette de fer, pontait et mettait le feu à la lumière percée au centre de cette culasse." Some sort of flashpan was more necessary with guns having the touchhole at the side, in order to retain the priming, which would otherwise have been apt to fall out. A Belgium example at the Porte-de-Hal, Brussels, catalogued No. 1, Series X, as a "coulevrine à main et à croc," affords a fifteenth-century example of a touchhole with an attached flashpan. The piece is octagonal outwardly at the chamber. Length of tube, 1.05 cm.; calibre, 0.022. The iron shaft or stock terminates with a ring, but the weapon is too heavy for use by a horse-soldier, as shown on Fig. 9. This harquebus is illustrated in two positions on Fig. 15 (*a* and *b*). The hand-guns of this period are forged very roughly, which is strange, considering the skill exhibited in this respect with knightly armour.

[1] *Festschrift*, p. 24.

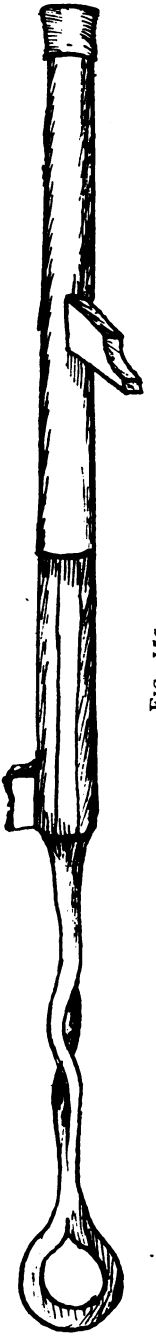

FIG. 15a.

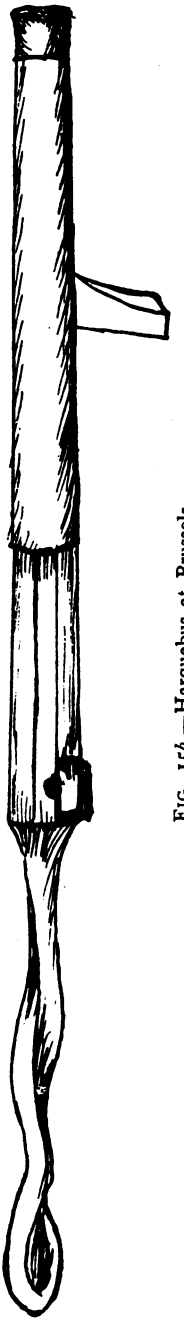

FIG. 15b.—Harquebus at Brussels.

Montfaucon says that the harquebus was first used at the Siege of Arras in 1414. An inventory of arms in the the Castle of Werningerode, in the Harz district of Germany, of the year 1441, mentions "6 hake-büchzen"; and in 1443 hakenbüchen are referred to in the account of the taking of Newburg.[1] After this date there is frequent reference to the weapon in German records.

The Accounts of the town of Lille, *anno* 1475, afford the following particulars for replacing a stock, cleaning, and renewing touchholes:—"A Jehan Delabarre, febvre pour avoir ferré les lumières de 2 haquebusches remis une manche à une autre et nettoyé la lumière de 25 autres 16s."[2] "Pour avoir ferré les lumières," would imply that the touchholes of the two pieces had been so worn as to need renewal. In the Laon accounts of 1358 the word "platine" would seem to be used for the vents of cannon: "Ferez et enchier denches et de platines par chacun." The term "manche" corresponds with that of "helvying" (pour emmancher), met with in the Tower Wardrobe Accounts of 1372-74—"Helvying eight guns and ten hatchets" (Roll, T. G., 674). Under the year 1478 the following entry appears in an account of the town of Dijon:—"Payé à Perronet Poinsart, maréchal, au prix de 3 f. chaque 12 harquebuches, dont 6 à manches de fer et les autres à manches de bois."[3] Thus, twelve harquebusches costing three francs a-piece, six of them with stocks of iron, the other moiety of wood. In the *Mémoires de Commines*, under the year 1495, the following passage occurs:—"300 Alemans qui avoient moult largement de coulevrines et leur portoit-on beaucoup de haquebutes à cheval."[4] These "harquebutes à cheval" were *sclopos;* and for cavalry they had usually light stocks of iron, with

[1] *Archæologia*, vol. xxxiii. p. 389.
[2] La Fons, *Artill. de Lille*, f. 27 (Gay).
[3] *Artill. de Dijon*, p. 34 (Gay).
[4] Commines, 1-8, c. vii.

a ring at the end, as shown on Fig. 9. A Warrant to the Constable of the Tower, dated February 26th, 1483, contains an order to deliver to Roger Beckley "eight serpentines upon carts; twenty-eight hackbushes, with their frames; one barrel of touch-powder, two barrels of serpentine powder."[1] The stock was called the frame of a gun in mediæval times, but the frames alluded to in the foregoing extract refer, I apprehend, to the large, square wooden rests projecting from under the bottoms of the stocks "to lie upon walls," as specified in the next extract, the kind so common during the sixteenth century;[2] but the weapons of 1483 were doubtless rougher. The extract shows that already at this period the harquebusier carried fine powder for priming and a coarser grain for charging. Another warrant of the same year (1 Ed. V.) specifies for delivery unto Thomas Tunstall "two serpentines, two guns *to lie upon walls*, twelve hackbushes, etc."

The word "harquebus," with variations, is sometimes applied in records, though very rarely, to weapons without spurs. This remark as to inaccuracy of description applies to almost all varieties of guns, owing partly to the lack of knowledge of firearms displayed by many early writers, which often causes uncertainty in interpretation.

The cannon at the Port-de-Hal, Brussels, catalogued (No. 2, Series X.) as "A petit cannon à main et tourillons, du xv. siècle," is a most interesting gun, and essentially a piece of ordnance, though so minute—0.775 m. in length. The chamber portion is octagonal in outward form, the barrel plain. The piece has a long, curved iron tail, with a knob at the end. Trunnions are present,[3] which work

[1] Harleian MS., No. 433.

[2] There is a fine collection of harquebusses on frames at the Porte-de-Hal Museum, Brussels.

[3] The approximate date of the introduction of trunnions is discussed in "Early Ordnance in Europe," *Archæologia Aeliana*, vol. xxv.

through rings placed in a small pyramidal stand. This small canon à queue is illustrated on Fig. 16.

Many improvements in hand-guns will be noticed as the

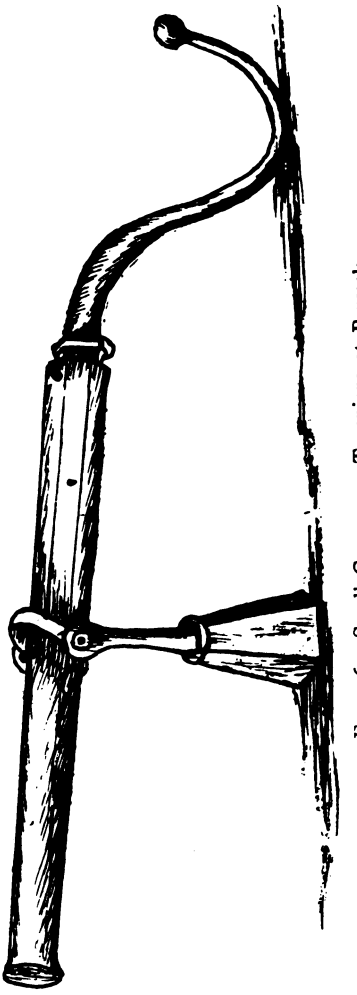

FIG. 16.—Small Cannon on Trunnions at Brussels.

century advances. The touchhole, now usually at the right side, is beaten out into a hollow ledge, or a pan is screwed on to the barrel. Still later, about 1530, the pan is provided

with a lid, moving on a pivot, the better to prevent the priming from being blown away by the wind and to shut out the rain and damp. The barrel is lengthened and more accurately forged, besides being more securely fitted into the stock by a longer tail-piece, and additional bindings are shrunk on. The tang is sometimes forged as a long or serrated rod, as on Fig. 13, which, when pressed home, gives much more stability to the weapon as a whole. Principles and proportions commence to be more clearly understood and applied, and we begin in a few cases to find examples of the second half of the century with the stocks cut something in the form the weapon ultimately assumed in most of the countries of chivalry. In Codex 719 in the Museum of Nuremberg, dating about the middle

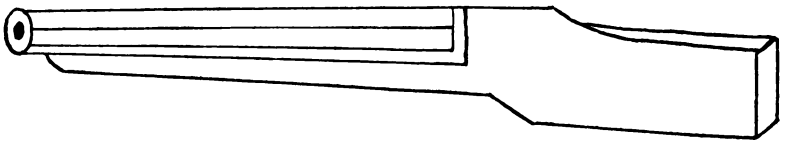

Fig. 17.—Hand-gun Sketch in Codex 719 at Nuremberg.

of the fifteenth century, a figure of a hand-gun is given, with a barrel one and a half times the length of the stock behind it, which is made thicker than hitherto, besides being better cut and more convenient to grasp. It is trimmed to the hand and squared to the shoulder; a long strip of the stock runs under and supports the now longer barrel. This weapon is further improved upon in some examples illustrated in a Landshut inventory of 1485, a record in the University Library at Heidelberg. The barrels are longer and the weapons more carefully made throughout and easier to handle in every way.[1] Here we have the form practically handed down to our own times, though the Spanish troops continued the straight stock. The heavy infantry harquebus was used with a rest. The

[1] *Zeitschrift*, B. I. s. 283.

hand-gun shown in Codex 719 is illustrated on Fig 17. An ordinance of Francis I. fixes the size of the harquebus for cavalry—*i.e.*, the sclopus, at two and a half feet in length or three feet at the utmost, the weapon to be carried at the saddle-bow in a case of "cuir bouilli."

The dilatory action of early ordnance was a great drawback, not only in respect to general efficiency, but also that cannon were being constantly exposed to capture in action after a first discharge by reason of the length of time required for re-loading the guns; and various expedients were resorted to for achieving a more rapid delivery of fire. The muzzle-loading cannon with fourteen small barrels, bound together round a cylindrical block of wood, and placed on a pyramidal stand, as drawn in Codex 600 at Munich, a MS. of about the year 1400, shows that attention was being drawn at a very early period in the history of gunnery towards means for obtaining a quick succession of fire from some of the smaller pieces, with a view to checking the rush of an enemy on the guns, in order to afford time for the then very protracted process of cleaning and re-loading the heavier ordnance. This invention was extended to hand-guns in the fifteenth century,[1] such multi-barrelled weapons taking various forms; one that of several barrels fitted horizontally side by side on to a board attached to a stock; in another two barrels were placed alongside one another, with a third laid above them. Drawings of these forms appear in Codex 10,824 in the Hof-bibliothek at Vienna, and in *Zeugbüchern* and arms inventories of the period. Essenwein gives reproductions of repeating hand-guns of this description dating from the reign of Maximilian I. (1493-1519), taken from *Codex icon* 222, in the Munich Hof and Staatsbibliothek, one of which drawings is copied on Fig.

[1] An entry of "Canon Polytublaire" occurs in an *Inv. de la Bastille* of the year 1435, which runs—"Ung canon à 7 troux, sans chambre, d'un espan de long ou environ."—GAY.

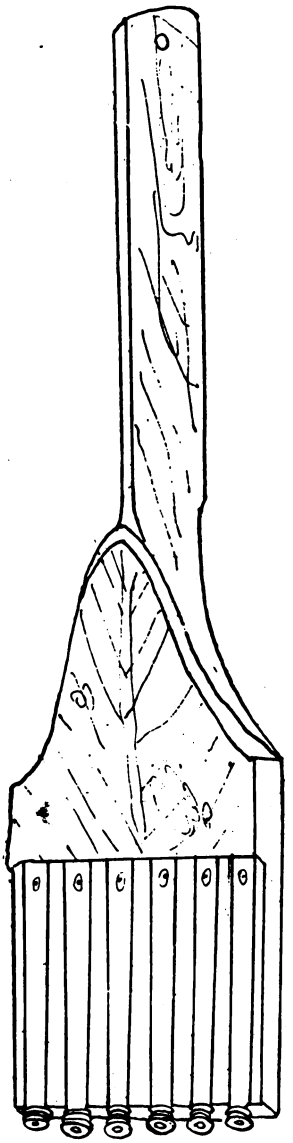

FIG. 18a.

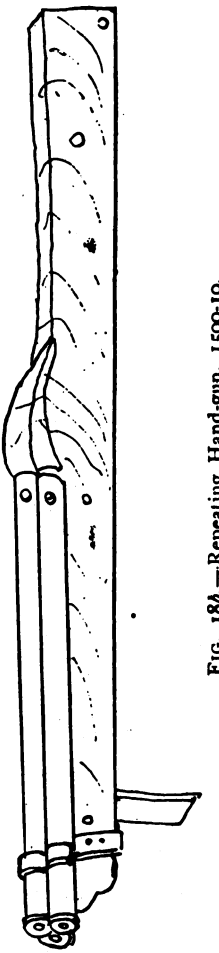

FIG. 18b.—Repeating Hand-gun, 1500-10.

18. This sort of weapon is the prototype of the *totenorgel* and modern *mitrailleuse.* All the ordnance shown on Codex 600 is muzzle-loading.

The movable chamber system furnished the gunners with a series of breech-blocks, kept ready loaded to be used in quick succession. The block was inserted in the chamber forged for its reception in the hinder end of the piece, and made fast by a wedge. This system was applied to cannon in England as early as *anno* 1338, and probably before that. In an indenture of that year, already quoted from in these pages, between John Starlying, formerly Clerk of the King's Ships, etc., and Helmyng, otherwise Helmingo Leget, Keeper of the same, and previously Keeper of the King's Barges, an entry occurs for delivery to the barge *Maria de la Tour,* running—"Un canon de ferr ove ii. chambres un autre de bras ove une chambre," etc.; and an entry in the inventory of stores of the *Christopher* (*X'pofre*) *de la Tour,* Captain Kyngeston, the same parties being concerned, of "iii. canons de ferr ove v chambres," has been already mentioned in these notes. Thus, we have iron and brass cannon with movable chambers at this early time in the history of ordnance.[1]

In Germany I have not found any mention of such weapons until *anno* 1412, when we have the following record:—"Nach Waldeck kam in diesem Yahre eine Kammerbüchse and 50 Steine dazu."[2]

[1] As far as is known, the breech-block system was contemporaneous, or nearly so, with that of forging cannon in two parts or lengths—the chamber and the barrel; the latter first laid in its wooden bed, secured by ropes, the chamber portion is then slipped into its place and adjusted in position by a wedge. Although we have no record, it is in every way probable that the more primitive system came first, and that cannon were employed at an earlier date than is generally supposed.

[2] *Quellen*, s. 20.

The earliest French records I have been able to find occur under the years 1431 and 1435; the former[1] in an account of the Duke of Burgundy, "L'une à clef et l'autre sans clef et pour six schambres." One of these weapons is provided with a serpentine, the other being without any appliance of the kind, but having six chambers. The passage of 1435 runs—"3 canon fournis de chambres, c'est assavoir chacun de 2 chambres."[2] The record of 1431 cannot well apply to anything but hand-guns, and the date is a very early one for the presence of a mechanical appliance for discharge. The chamber system was also extended to hand-guns, though probably not before late in the fourteenth or early in the fifteenth century; and examples of breech-loading weapons of this kind may be seen in the Germanische Museum, Nuremberg, and at the Porte-de-Hal, Brussels. These pieces are heavy for handling, usually with a minimum weight of about 23 pounds, and going up to half a hundredweight. They required the co-operation of two men to load and discharge, and present obvious inconveniences in their use. A drawing of a breech-block follows on Fig. 19.

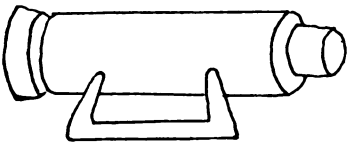

FIG. 19.—Movable Chamber (Breech-block), 1510.

A town account of Munich of 1431 mentions stone balls cased in lead.[3]

We have seen from Burney MS. No. 169—a record of the second half of the fourteenth century—the figure of a foot-soldier[4] discharging his piece with the stock held under

[1] *Zeitschrift*, I. p. 251. Quoted by Sixl.
[2] *Inv de la Bastille.* Quoted by Gay.
[3] *Quellen*, p. 28. [4] As shown in Fig 3.

his left arm, and applying a burning match with his right hand; but such a hand-gun must have been a mere toy, and incapable of any precision of aim. A more serious weapon would require to be discharged from the breast or shoulder, but it seems impossible for one man to have held a much heavier piece in either position, even with the support of a rest, and at the same time to have applied a burning match and discharged the weapon with any ease or accuracy of aim without the co-operation of a comrade; and to make a hand-gun suitable for one man to handle with any ease and efficiency some mechanical assistance was indispensable. To this end we find in early records drawings of various attempts made with a view of achieving this desideratum. But many of these inventions would not work in practice, and were never applied in actual warfare, though there is reason to believe that some of them were practically applied in shooting competitions at the target, when the weapons were subjected to a much less trying treatment than would have been the case in campaigning. The shooting guilds, corporations, and associations in the different states of Europe and the free towns of Germany played a great part not only in the promotion of marksmanship, but in the improvement of the weapons themselves; and competitions were greatly patronized by royalty, and prizes of considerable value given.

The question of the chronology and mechanism of attempts made in the direction of a gunlock is one full of doubt, difficulty, and apparent contradiction; and it is far from clear that anything of the kind was in general use much before the sixteenth century began, the reason probably lying in the uncertain action exhibited by the earlier contrivances for bringing the burning match into any regular contact with the priming in the flashpan, more especially as all the earlier forms of the movement called "the serpentine" were very liable to get out of order under

the then rough conditions of campaigning, and the weapons thus being apt to miss fire. There was some experience ready to hand in the mechanism of the crossbow, which only required adaptation for the purposes of the hand-gun; but the appreciation of this fact came slowly. Contemporary records supply us with but little information

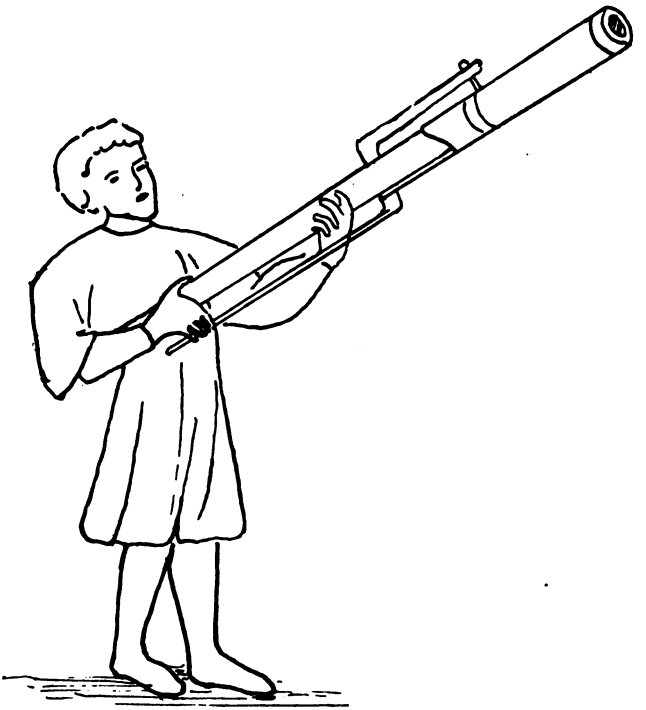

FIG. 20.—Figure with Hand-gun showing early form of Serpentine.

concerning very early mechanical methods of ignition, and we can only form some idea of their construction from the position and form of the serpentine, as shown with figures on illuminations. Efforts were being made right through the fifteenth century to adapt this invention practically, and an illustration of what is probably the earliest form of this movement occurs in Codex MS. 3,069. This docu-

ment, now at Vienna, is of early fifteenth century date; and the invention, as shown on the illumination, anticipates the principle of the matchlock by many years, though in a very elementary and precarious fashion. This rude form of the appliance—named serpentine from its resemblance in shape to the tortuous movements of a snake, as shown on Fig. 20—is a long, narrow iron rod, a lever of two arms or branches, which works on a pivoting-pin passed through the stock of the piece. It is bent rectangularly, the lower arm forming a long trigger, then called a sear, whilst the upper arm of the lever extends along the top side of the piece. On a pressure of the fingers on the sear, the lighted match, held in a pair of nippers at the upper end of the serpentine, is brought down into contact with the priming in the flashpan of the piece. The marksman shown on Fig. 20, clad in a tunic reaching below the knees, holds the weapon at the present at a considerable angle, the butt-end under the right arm; the right hand supports the high end of the stock, with the fingers pressing the sear, whilst the left hand grasps the weapon further towards the muzzle of the piece.

That this is no solitary instance of this form of serpentine is shown by the drawing of a hand-gun with a similar movement for discharge occurring on Codex MS. No. 55, in the Kunst-historisch Collection at Vienna, a document probably of the first quarter of the century. The hand-gun itself is formed in two separate cylindrical parts, a chamber and a barrel, like an early form of cannon. The Froissart edition, preserved in the town library at Breslau, gives on a miniature a drawing of a centaur armed with a hand-bombard or culverin, with apparently a similar movement for ignition; but the scale of the figure is too small to be quite certain. If this clumsy form of serpentine was ever practically applied to hand-guns, which is more than doubtful, it must have been soon abandoned, for any gun fitted with it would have been apt to miss fire,

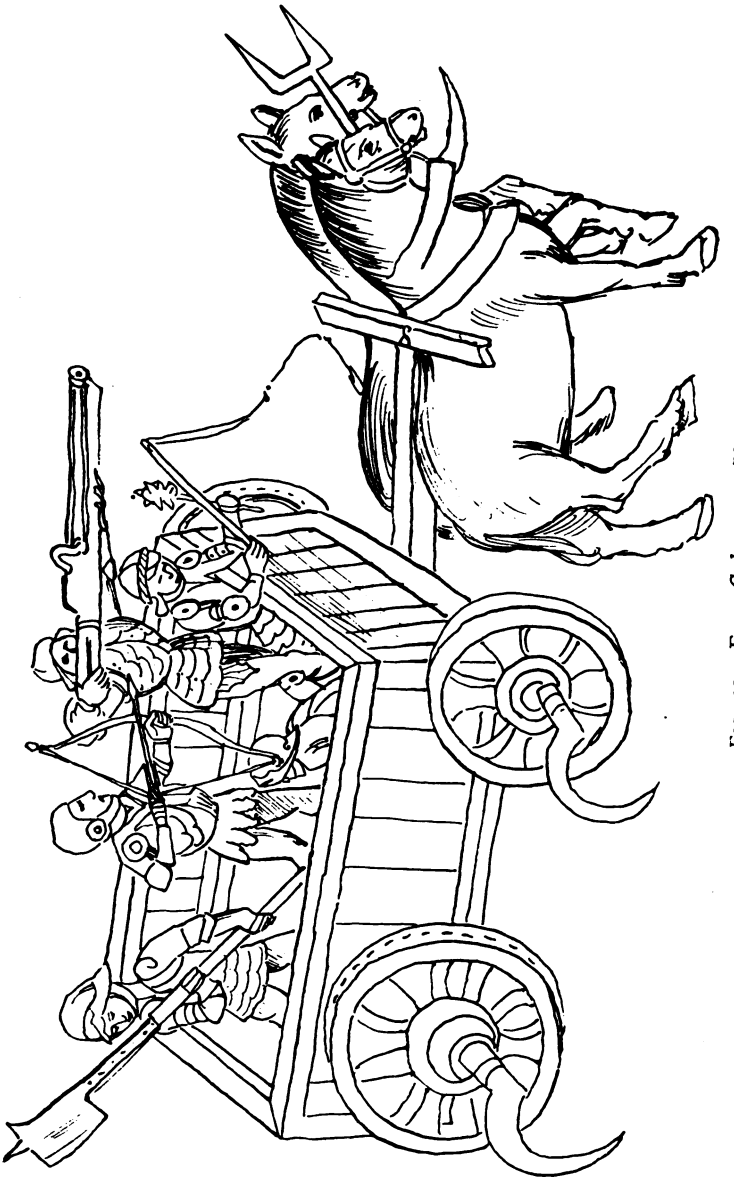

FIG. 21.—From *Codex germ.* 734.

owing to the uncertain action of the movement and difficulty of keeping it in order. Another curious and impracticable form of serpentine is illustrated in Codex MS. 1,390, in the University Library at Erlangen, a record dating in the second half of the fifteenth century. A long straight iron rod springs from a square button, working on a pin or screw. The match hangs from the upper end of the rod, and a forward turn of the button by the fingers brings it down on the touchhole of the piece. One cannot resist the conviction that many of the representations on illuminations of early methods of firing merely convey some new idea of an inventor or an experiment, and that they were never employed in warfare; the same thing also applies to some actual specimens in collections of both hand-guns and ordnance.

The first form of serpentine concerning which there is any contemporary evidence of ever having been used in battle is a narrow rod or bar of iron formed somewhat semi-circularly, or like the letter S, one end of which is pivoted to the stock of the hand-gun, while at the other end is a pair of nippers, fashioned like the mouth of a snake, for holding the match-end, adjusted in its place by a screw. A movement of the index finger of the hand turns round the bar on its pivot, bringing the end holding the burning match-cord into contact with the priming in the flashpan. There is thus neither sear nor spring. An early example of this form occurs in *Codex germ.* 734, a MS. in the royal library at Munich dating in the third quarter of the fifteenth century. The marksman, clad in the Gothic armour of the period, is in the act of discharging his piece from a military cart drawn by a pair of horses; scythes are attached to the axle-boxes.[1] Fig. 21

[1] In an undated edition of Vegetius are woodcuts of two similar military carts, one drawn by horses, the other by oxen. They are manned by soldiers variously armed with spears, a longbow, a crossbow, and one of them is discharging a hand-gun of a ruder type

affords an illustration. A later example of a hand-gun with serpentine is given on Fig. 22, taken from *Codex icon.*

FIG. 22.—Harquebusier, *temps* Maximilian I.

than that shown on Fig. 21. Two of the soldiers are clad in what looks like banded-mail. These armed carriages belong to the class of fortified wheeled-platforms called "Ribandequins," a designation inherited from the mechanical war-engines of that name, a machine shooting great feathered arrows. Muratori tells us how Antonio Scala employed "ribandequins" on which bombardelles were mounted, against Carrara in 1376, and a train of these carts formed part of the armament of John, Duke of Burgundy, when he marched on Paris in 1411.

222, in the royal library at Munich. The figure is that of a harquebusier of the reign of the Emperor Maximilian I., holding his weapon at the present. This form occurs in *Machinaram liber,* a work of about 1468, already alluded to. There are many examples of this serpentine in contemporary illustrations, for it continued in use for more than half a century, and, being of simple construction, was not so likely to get out of order as less direct methods of ignition.

The contingent of 300 Burgundians in the ranks of the army of Edward IV. at the second Battle of St. Albans, in 1471, was probably armed with weapons having a serpentine of this kind, and which Philip de Commines refers to as a new invention. The match-cord was of cotton or hemp, steeped in a strong solution of saltpetre.

The second half of the fifteenth century saw great improvements in hand-guns, as well as ordnance, and we find in *Codex germ.* 599, at Munich, a MS. bearing the date of 1475, an illustration of a weapon much more advanced than any yet met with in *Zeugbüchern* and other records of the reign of the Emperor Maximilian I. (1493-1519). This piece, illustrated on Fig. 23, is provided with a lock-plate, the wall against which the interior mechanism of a lock rested, and here a method of release by a spring must have been employed. The plate is attached to the stock by two screws, the cock[1] falling in the direction of the muzzle by the pressure of the finger on the sear, probably setting free a spring and releasing the cock. There are breech and muzzle-sights. Here we have an early form of matchlock, a class of gun-lock still in use during the reign of William and Mary (1689-94). This example is probably yet another of those inventions in advance of their time, for we meet with nothing like it in

[1] German, *hahn;* French, *chien;* Italian, *cane;* Spanish, *gatillo.*

practice for long afterwards. This particular lock is stated to be the work of the celebrated maker, Martin Merz, and to have been dated *anno* 1475,[1] eighteen years before the accession of Maximilian to the imperial throne.

A Breslau inventory of 1483 schedules numerous small hand-guns as "Pischallen," but I can say nothing of the

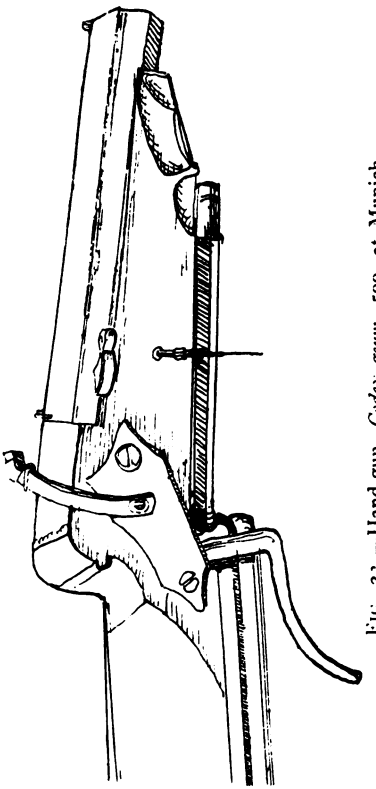

FIG. 23.—Hand-gun, *Codex germ.* 599, at Munich.

etymology of the word or its connection with the designation "pistol," beyond a certain resemblance in the words, and that they both denote small hand-guns.

The influence exercised on military tactics by hand-guns

[1] *Zeitschrift*, Sixl, i. p. 255.

and vice versa was inconsiderable until after the close of the third quarter of the fifteenth century, up to which time the footmen carrying these weapons had been distributed among the other infantry; but towards the close of the century they were formed into separate companies, together with the *ribaudequins* or military carts, and attached to the ordnance train. The arming of cavalry with light hand-guns at an early period in the history of firearms has been already alluded to. The part played by hand-guns in tactics became increasingly important as the sixteenth century aavanced, and in course of time they may be said to have completely revolutionized the art of war.

I hope later to carry the subject on to more recent times.

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